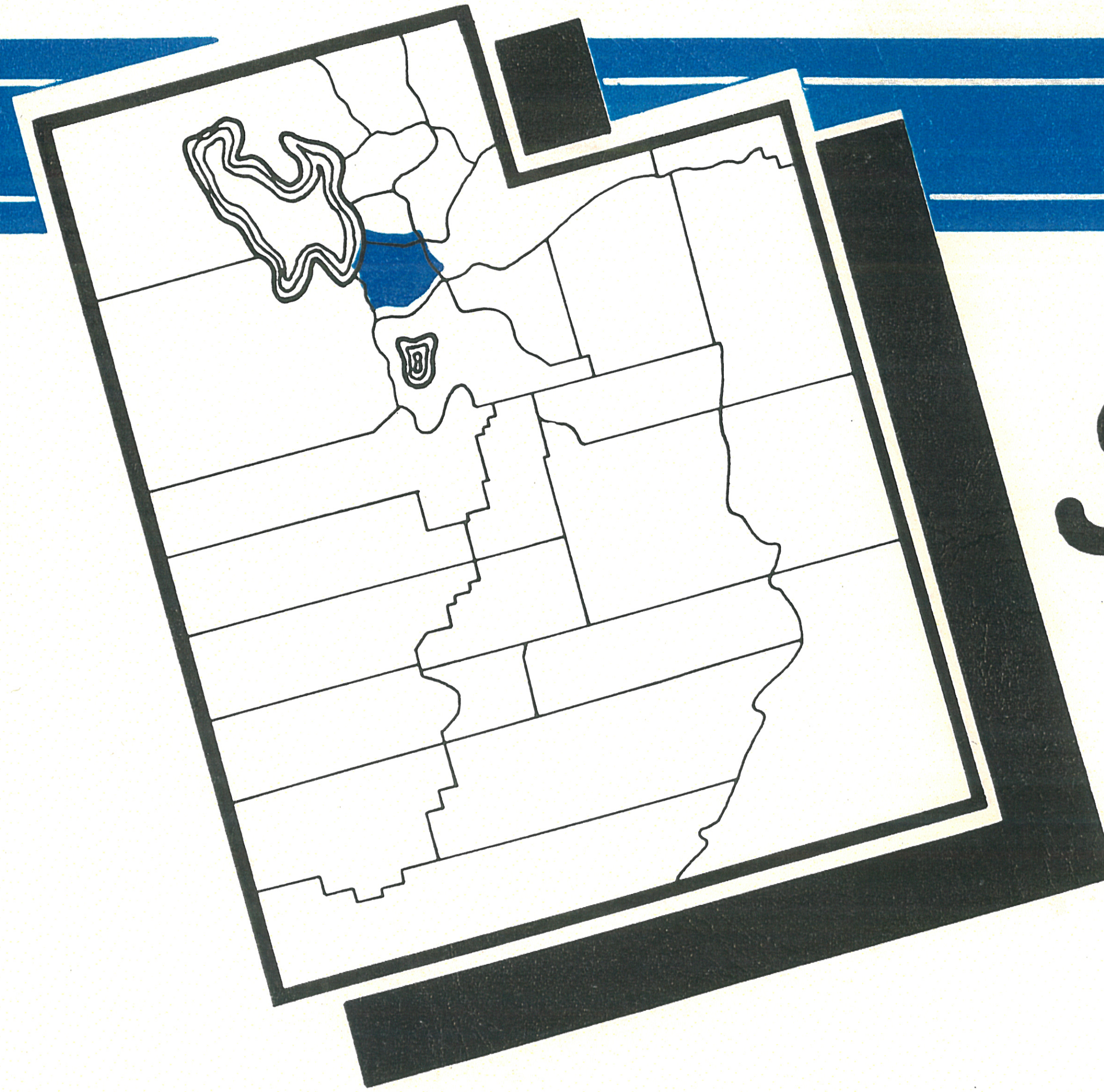
Fitzhugh D. Davis
Patrick J. Sizemore



MATERIALS INVENTORY

SALT LAKE COUNTY

DISTRICT TWO
MATERIALS SECTION
UTAH STATE
DEPT. OF
HIGHWAYS

- POTENTIAL SOURCES
- PIT LOCATIONS
- TEST DATA
- GEOLOGY

UTAH MATERIALS INVENTORY

AGGREGATE SOURCES
AND
GEOLOGY OF

SALT LAKE COUNTY

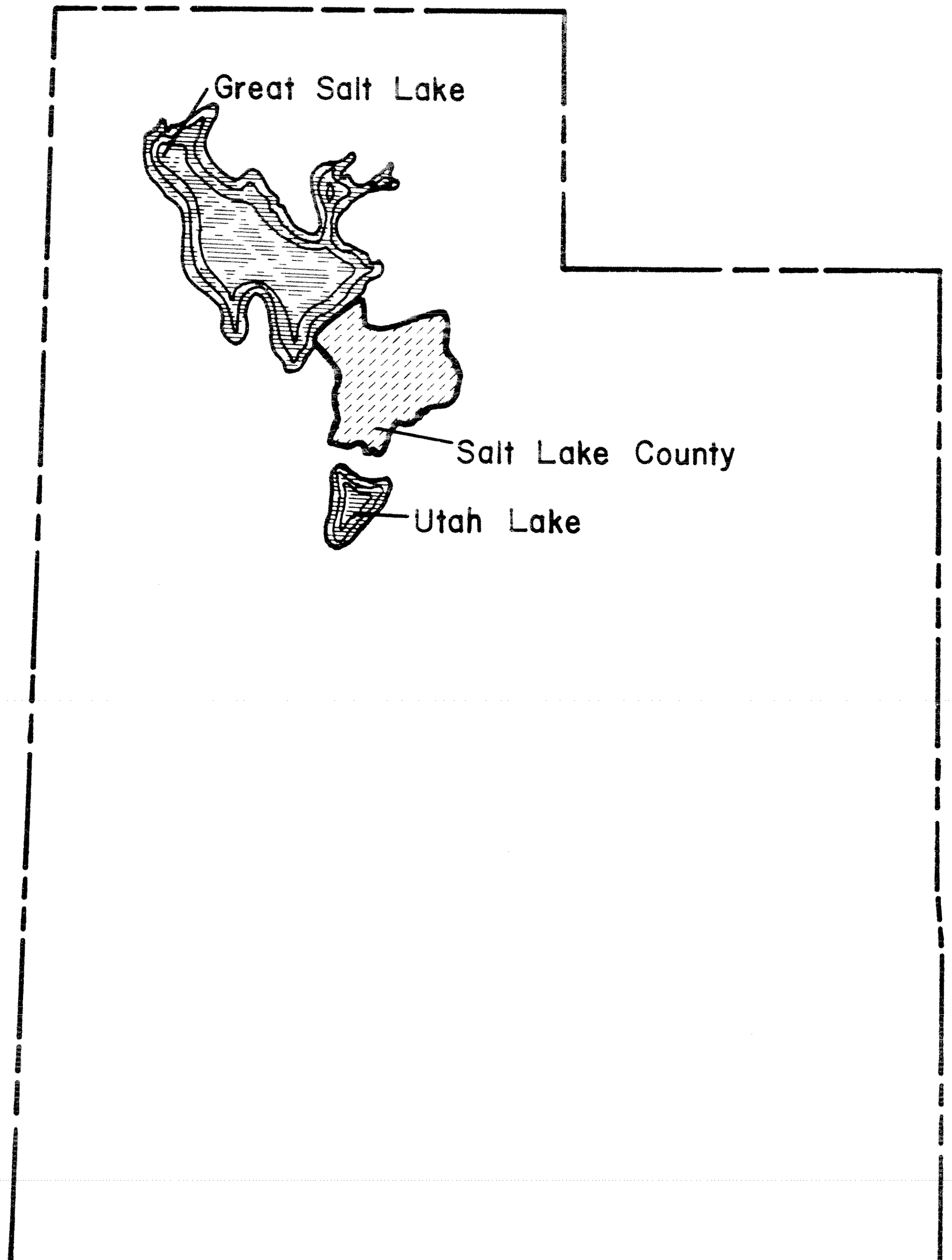
PREPARED BY
THE
DISTRICT TWO MATERIALS SECTION

MARCH 1964
UTAH STATE DEPT. OF HIGHWAYS

In cooperation with the
Geology Department of the
MATERIALS AND RESEARCH DIVISION

Lithographed by the Reproduction Department, Utah State Road Commission

MAP OF UTAH SHOWING SALT LAKE COUNTY



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MATERIALS INVENTORY

Purpose

The purpose of the Materials Inventory is threefold. First, it enables the Utah State Department of Highways to more accurately locate, investigate, and catalog the materials needed for highway construction. Second, it makes possible a system by which an accessible, permanent, and up-to-date record may be kept on every materials site that is now owned or will be purchased or optioned by the Department of Highways. Third, it makes possible the establishing of map and file records of the known materials sites in the State, other than those owned or optioned by the State.

The inventory is extremely valuable in eliminating the wasteful duplication of work that has been common in locating materials sites. General information on known materials sites and prospective sites will now be available on a county basis in booklet form. More detailed information is available from a central file in the Materials Inventory Section of the Materials Division and in the respective District Materials Sections.

Notwithstanding the enormous quantities of road-building materials that are now available in the State, it must be realized that one day these materials may be depleted or completely unobtainable due to the encroachments of man. As highways improve, the quality of materials that are used in highway construction must also improve. Good quality material is not readily available in all places, and this fact alone makes it necessary to locate and secure choice sites before they are depleted or become unobtainable. The recent advent of the Federal Highway Program has further emphasized the necessity for large quantities of high quality material for highway construction. This program has pointed up to the Department of Highways some of its shortcomings in exploration procedures, the knowledge of what is available, and the foresight to organize and tabulate this information. The Materials Inventory is designed to remedy this situation.

Procedures

The Materials Inventory functions in the following manner. The initial step is to locate, evaluate, and record all pertinent data on each known materials site in the District. Form MI-1, entitled "Preliminary Materials Survey" (see fig. 1), is especially designed for the collection of the initial materials inventory data while in the field. The information contained on this form includes approximate grading, type of material, type of deposit, rock type by the pebble-count method, surface conditions of the site and area (indicating obstructions to excavation, etc.), impurities in the material (sand lenses, clay lenses, cementation, etc.), accessibility of site, quantity and quality of material, site number, ownership, and location of site. Form MI-1 will be filed in the central file and the district file.

While visiting each site the investigator collects a representative sample of the material and laboratory tests are later conducted on this sample to determine its suitability for highway construction.

To aid in the search for potential sources of material, the Materials Inventory Section has outlined on the "General Highway Maps" the location of bedrock and the location of unconsolidated sediments (see Pit Locations and Potential Sources Map). These maps are a combination of geologic and soil-survey maps and are complete in as far as information is available. As more work is done with the unconsolidated sediments in the valleys, these maps will become increasingly more accurate. The chief value of these maps at the present time is to enable those who are searching for construction materials to narrow their field of exploration to those areas which are most promising. Since these maps show the location of known materials sites as well as the geology, they will enable an investigator to determine what relationships exist between the bedrock geology, the valley-fill sediments, and the known site. By recognizing these relationships, the investigator should be able to predict other possible materials sites. In addition, as these maps increase in detail they may well become valuable in highway location and planning.

Some of the information obtained by testing the representative samples taken from each known site or potential site is transferred to a general Test Data Sheet. This sheet includes tests conducted on the representative samples from each known site or potential site in a county. The data sheet accompanies the Pit Locations and Potential Sources Map in the booklet published on each county.

A permanent file contains all of the available and current detailed information concerning an individual site. A special form, MI-2 "Materials Source Data" (see fig. 3) is used to record and keep up to date all of the information concerning a materials site. This form contains all of the information on the Test Data Sheet and the Preliminary Materials Survey card, plus a complete layout of the materials site, logs of all test borings, all tests conducted on the material at the site, and other pertinent information.

The MI-3 form, "Pit Evaluation Report" (see fig. 2), constitutes one of the methods by which the Materials Source Data form and the inventory is kept up to date. This evaluation form is filled out by the Project Engineer or by the district materials personnel after a pit has been used for a project and is then submitted to the Materials Inventory Section. The evaluation form contains questions to be answered which will enable the materials inventory personnel to bring the Materials Source Data form and the inventory file up to date.

The Pit Locations and Potential Sources Map of each county has two symbol shapes to indicate the basic material types (gravel and borrow). The symbol shapes and their meanings are fully explained in detail in the legend on the map.

It should be kept in mind that certain pits may contain both gravel and borrow material, and this makes it very difficult in many cases to label the material collected as representative of the pit. This also leaves some doubt

MATERIALS INVENTORY FORMS

7	4	2	1	U	2	1	7	4	2	1	W	S	E	N	2	1	7	4	2	1	7	4	2	1	7	4	2	1
OWNERSHIP				SECTION							RANGE										TOWNSHIP							

Preliminary Materials Survey

Form MI-1

Project ______ ***Project No.*** ______ ***County*** ______ ***Pit No.*** ______

I. GRAVEL ___ BORROW ___
1. Boulders 3" ___, 6" ___, 12" ___, 18" ___ %
2. Course Gravel 1"–3" ___ %
3. Fine–Medium Gravel 1mm–1" ___ %
4. Sand... 1/16–1mm ___ %
5. Silt... ___ %
6. Clay... ___ %
7. Exposed... ___ Yes ___ No
8. Depth of exposure ___ feet
9. Gravel... ___ Rounded ___ Subrounded ___ Angular

II. TYPE DEPOSIT
1. Beach ___
2. Spit ___
3. Lake Terrace ___
4. Delta ___
5. Lake Floor ___
6. Alluvial Fan ___
7. Stream Channel ___
8. Flood Plain ___
9. River Terrace ___
10. Dune ___
11. Talus ___
12. Bedrock ___
13. Other ___

III. ROCK TYPE

Pebble Count
100 pebbles... +1"
1. Limestone ___
2. Shale ___
3. Sandstone ___
4. Quartzite ___
5. Gneiss ___
6. Schist ___
7. Granite ___
8. Basalt ___
9. Other ___

IV. SURFACE CONDITIONS
1. Boulders >18" ___ %
2. Brush ___ Heavy ___ Light
3. Relief of deposit ___ feet
4. Area: ___ Residential ___ Farming ___ Industrial ___ Grazing ___ Unimproved ______ Other
5. Dike ___ Yes ___ No
6. Dam ___ Yes ___ No
7. Power Poles ___ Yes ___ No
8. Rail Road ___ Yes ___ No
9. Buildings ___ Yes ___ No
10. Lake ___ Yes ___ No
11. Marsh ___ Yes ___ No
12. Flowing Stream ___ Yes ___ No
13. Spring ___ Yes ___ No
14. Ravine ___ Yes ___ No
15. Other ______

V. IMPURITIES
1. Cementation ___ well ___ poorly ___ none, thickness ___ feet
2. Particle Coating ___ $CaCO_3$, ___ FeO, ___ None
3. Lenses & or beds: ___ Sand ___ Silt ___ Clay
   Thickness......... ___ " ___ " ___ "

VI. ACCESSIBILITY
1. ___ Good ___ Poor ___ Inaccessible
2. Access road ___ improved ___ unimproved ___ private ___ public
3. Surface: ___ gravel ___ sand ___ clay ___ concrete ___ bituminous
4. Accessible by: ___ drill ___ backhoe ___ cat

VII. PROSPECT & QUANTITY
1. ___ Used pit ___ Unmined prospect
2. Used pit est. extension ______ cu. yds.
3. Unmined prospect: Granular material thickness ___ feet. Area ___ acres Est. quantity ______ cu. yds.
4. Overburden ______ feet
5. Binder available ___ Yes ___ No

R ___ ___
T ___ ___

QUANTITY 7 4 2 1 — PIT NUMBER 7 4 2 1 7 4 2 1 7 4 2 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	0	1	2	4	7	1	2
MATERIAL																							COUNTY					

FIGURE 1. Reproduction of the Preliminary Materials Survey form MI-1 on the needle-sort card. The actual card is 8 x 5 inches.

Form MI-3

PIT EVALUATION REPORT

PIT NO. ______ DATE ______

DATE LAST WORKED ______ MATERIAL REMOVED ______ ☐ tons ☐ cu. yds.

BASE AND SURFACE GRAVEL ___

___ Base ___ Type A ___ Type B ___ Type C ___ Type D

COVER MATERIAL ___

___ Type A ___ Type B ___ Type C ___ Type D

CONCRETE PAVEMENT ___

___ Large ___ Small ___ Sand

CONCRETE ___

___ Type A ___ Type B ___ Type C ___ Type X ___ Type Y

PLANT MIX BITUMINOUS ___

___ Type A ___ Type B

BITUMINOUS CONCRETE ___

___ Type A ___ Type B ___ Type C ___ Type D

MINERAL FILLER USED? ☐ yes ☐ no PERCENT USED ___

GRANULAR BACKFILL UNDERDRAIN ☐ yes ☐ no

QUALITY (for project) of MATERIAL ___ good ___ fair ___ poor
UNIFORMITY OF MATERIAL ___ good ___ fair ___ poor
WAS BLENDING NECESSARY? ☐ yes ☐ no
LENSES PRESENT? ☐ gravel ☐ sand ☐ silt ☐ clay
LENSE THICKNESS ___ " ___ " ___ " ___ "
AMOUNT OF OVERSIZE ___ % WAS WASHING REQUIRED? ☐ yes ☐ no
WAS ADDITION OF MINUS #200 NECESSARY? ☐ yes ☐ no
WAS STRIPPING OF OVERBURDEN REQUIRED? ☐ yes ☐ no
AVERAGE OVERBURDEN THICKNESS ___ feet ___ inches
ESTIMATED QUANTITY OF MATERIAL REMAINING ______ ☐ tons ☐ cu. yds.
ARE FURTHER TESTS NECESSARY TO DETERMINE REMAINING QUANTITY? ☐ yes ☐ no
UNUSUAL FEATURES OF PIT ______

DIFFICULTIES OF OPERATION ______

RECOMMENDATIONS FOR FUTURE USE OF PIT ______

BY ______

FIGURE 2. Reproduction of the Pit Evaluation report form MI-3. The actual form is 8½ x 11 inches.

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS SOURCE DATA

Form MI-2

LAYOUT ______ SCALE ______ CONTOUR INTERVAL ______

Layout By ______ (name) ______ (date)

Pit No. ______ Project Name ______
Project No. ______ County ______ State ______
Owner ______
Address ______

Property
Optioned ___ Expiration Date ______
Cost: ___ per Cu. Yd. ___ per Ton
Public Domain Set Aside ______
Date From ______ To ______
Prospect Only ______

T ___ ___
R ___ ___

Dead Haul ___ miles to ______
or ___ miles to ______

Material	Thickness (ft.)	Quantity (cu. yds.)
Gravel		
Borrow		
Overburden		

Area of Deposit ______ acres
Type of Deposit ______
Investigations with: Drill ___ Backhoe ___ Cat ___ Other ______

LAYOUT INSTRUCTIONS: Show deposit layout, with test holes properly located and numbered. Indicate the north point, land ties, land lines and ownership. Show topography, drainage, power poles, or other obstructions to excavation. Gravel should be outlined in green, borrow in brown, and haul roads in red.

LOG OF TEST HOLES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

O'burden & Fill Clay Silt Sand Gravel Solid Rock

Ground Water Table ___ Vertical Scale ______
Test Hole Log by ______ (name) ______ (date)

FOLD LINE

TEST VALUES

COARSE AGGREGATE

Test Hole No.	Field Sample Number	Laboratory Number	Sample Depth (ft)	Maximum Size	% > 3"	Laboratory Values: Percent Passing 3"	2"	1½"	1"	3/4"	½"	3/8	No. 4	No. 10	No. 40	No. 80	No. 200	Liquid Limit	Plasticity Index	Swell	Spec. Type

Rock Type (% of each) ______

Cementation of deposit: ___ None ___ Partial ___ Complete. Thickness of cementation ___ ft.
Particle Coating: ______
Wear L.A. Rattler ___ % Soluble Salts ___ %
Additional Tests for Concrete Aggregates:
Soundness ___ % Loss
Absorption ___ %
Specific Gravity ______
Other ______

Remarks ______

BORROW

Test Hole No.	Field Sample Number	Laboratory Number	Sample Depth (ft)	Maximum Size	% > 3"	Laboratory Values: Percent Passing 3"	2"	1½"	1"	3/4"	No. 4	No. 10	No. 20	No. 40	No. 200	Percent Gravel	Coarse Sand	Fine Sand	Silt - Clay	Liquid Limit	Plasticity Index	C.B.R. Min. % Std.	Dry Den. lb/ft.³	Swell	Proctor Opt. % Moist.	Dry Den. lb/ft.³	Classification A.A.S.H.O.

Samples Submitted by ______ (name) ______ (date)   Test Data Added by ______ (name) ______ (date)

FIGURE 3. Reproduction of the Materials Source Data form MI-2. The actual form is 11 x 16 inches.

as to whether a pit should be called a gravel or a borrow pit. As a general rule, the most abundant or best material has been indicated. In such cases, the central file or the district file will contain completed test information which can determine a final designation.

Roy D. Tea, District 2 Materials Engineer; Norbert W. Larsen, former Geologist for the Central Laboratory; and J. Derle Thorpe, former Research Engineer for the Central Laboratory were instrumental in initiating the Materials Inventory, in establishing procedures for the functioning of the inventory, and for the format of the booklets.

Field work for the Salt Lake County Inventory was begun in 1961. The geology and checking of aggregate sources was accomplished mainly by Heber Vlam, Geologist from the Materials and Research Division. He is also credited with the geologic text and photographs used in this booklet. Some additional geology and location of material sites was done by Dyke LeFevre, Materials Engineer, and Gene Sidler, Geologist from the District Two Materials Section. Gene Sidler was also responsible for the compilation of the test data sheets and the materials sources maps. Mike Bullett, District Two Materials Section Draftsman, is credited with drafting of the materials sources maps and other related work. Testing of materials was accomplished jointly by the District Two Materials Section and the Central Materials Laboratory. The entire Materials Inventory Booklet was organized, assembled and prepared under the direct supervision of Roy D. Tea, District Two Materials Engineer.

SALT LAKE COUNTY --- GENERAL GEOLOGIC SETTING

Structural Elements

Salt Lake County, in North-Central Utah, comprises approximately 760 square miles. It lies partly within the Rocky Mountain physiographic province and partly within the Basin and Range physiographic province.

The major structural element in Salt Lake County is the lower Jordan (Salt Lake) Valley. The lower Jordan Valley occupies the central part of Salt Lake County, and is bounded on the east by the Central Wasatch Mountains; on the south by the Traverse Mountains; on the west by the Oquirrh Mountains; and on the north by Great Salt Lake and the Salt Lake Salient of the Central Wasatch Mountains.

The Lower Jordan Valley

Geomorphically, the lower Jordan Valley is a structural basin in the Basin and Range physiographic province, and is part of the interior basin which in Pleistocene time was occupied by several lakes, the last of which was Lake Bonneville. Presently the basin is partly filled with unconsolidated and semi-consolidated deposits of lacustrine and fluviatile origin. These sediments, derived primarily from the adjoining mountains, are composed mainly of quartzite and limestone, but also include quartz monzonite, sandstone, metamorphic rocks, and extrusive volcanics.

The boundary between the basin and the encircling mountains can be placed at the Bonneville shoreline. Near this elevation (5,135 - 5,200 feet) the irregular topography of the mountains gives way to the smoother lines of the valley, lined with lake deposits.

The lower Jordan Valley is drained by the Jordan River, which flows from Utah Lake northward into the Great Salt Lake. The area of the lower Jordan Valley is about 400 square miles.

Central Wasatch Mountains

The lower Jordan Valley is bounded on the east by the Central Wasatch Mountains, the westernmost unit of the Rocky Mountain physiographic province.

The youngest rocks in the Central Wasatch Mountains are Jurassic sandstones and limestones, which are exposed in the Emigration Canyon syncline, east of Salt Lake City. Both northward and southward from this syncline progressively older rocks are exposed. The oldest rocks north of the Emigration Canyon syncline are the gneisses, schists, and granites of the Precambrian Farmington complex north of the Salt Lake Salient. The oldest rocks south of the Emigration Canyon syncline are the quartzites, gneisses, and schists of the Precambrian Little Willow series between Big and Little Cottonwood Canyons. In the Little Cottonwood Canyon area, quartz monzonite of Tertiary age has intruded the Precambrian rocks. The relief of the Central Wasatch Mountains is about 6,000 feet.

Traverse and Oquirrh Mountains

The Traverse and Oquirrh Mountains, which bound the lower Jordan Valley on the south and west, respectively, consist principally of the quartzites, limestones, and shales of the Pennsylvanian Oquirrh formation. The eastern foothills of the Oquirrh Mountains are composed of the Harkers fanglomerate (fig.14) and extrusive volcanics. These same volcanics make up the bulk of the northern foothills of the Traverse Mountains.

The Oquirrh Mountains have a relief of approximately 4,000 feet. The Traverse Mountains consist primarily of smooth, rounded hills, whose relief is only about 1,500 feet. The Traverse Mountains are bisected by the Jordan River in a water gap called the Jordan Narrows.

Salt Lake Salient

The Salt Lake Salient, which is an east-west trending projection of the Central Wasatch Mountains, bounds the lower Jordan Valley on the north-east. The salient is composed chiefly of lower Paleozoic limestones, overlain unconformably by the Cretaceous Wanship - Echo Canyon formation and the Tertiary Knight conglomerate. In the City Creek Canyon area undifferentiated Tertiary volcanics are exposed in several localities. The relief of the Salt Lake Salient is approximately 1,700 feet.

STRATIGRAPHY OF LAKE BONNEVILLE SEDIMENTS

General Statement

By far the most important source of aggregate material in Salt Lake County lies in the tremendous sand and gravel deposits accumulated in, and reworked by Pleistocene Lake Bonneville. These gravels are confined to the lower Jordan (Salt Lake) Valley, where they occur up to approximately 5200 feet, the highest level of the lake.

The rocks making up the mountains surrounding the valley were the source from which most of the Lake Bonneville sand and gravel deposits were derived. Many formations contributed significantly to these gravels. However, these same formations are presently not considered to be important as materials sources, because of the great availability and volume of the Lake Bonneville deposits. Exceptions occur where talus slopes, alluvial fans, mine dumps, and glacial deposits, which can be utilized locally, are found in the canyons. The time will probably come, however, when the Lake Bonneville gravels are exhausted, or entirely overrun by housing developments and other types of construction. At that time some of the bedrock formations in the mountains surrounding the valley may become important sources of aggregate material.

Alpine Formation

The Alpine formation is generally recognized as representing the oldest formation deposited in Pleistocene Lake Bonneville. The formation consists of a shore facies of gravel and sand, and an offshore facies of fine sand, silt, and clay. The offshore facies is usually buff in color.

The beach and spit gravels, which predominate in the Alpine shore deposits, have a very small median grain size, and show a great variation in the degree of rounding. The well-rounded pebbles are derived primarily from the Cretaceous Wanship-Echo Canyon formation and the Tertiary Knight conglomerate along the northeastern margin of the valley.

The embankment gravels of the Alpine formation near Big and Little Cottonwood Canyons consist of pebbles and cobbles of quartzite, quartz monzonite, and argillite, derived from earlier moraines and out-wash gravels, which were reworked by the lake at the Alpine level (5,050 feet). Figure 4 shows the Alpine embankment gravels east of Wasatch Boulevard near Big Cottonwood Canyon. The thickness of the gravels shown is about 50 feet.

The shore gravels of the Alpine formation contain numerous mud-rock flows. One such flow (fig. 5) occurs near Dry Creek in the northeastern part of the valley.

There is often an abrupt facies change from shore gravels to offshore silts in the Alpine formation. Figures 12 and 15 show occurances of this facies change in the northeastern and western part of the valley, respectively.

The sands, silts, and clays of the offshore facies of the Alpine formation show very uniform texture and stratification. They attain a maximum thickness of about 250 feet, and occur over a far greater area than the comparatively narrow belt of the shore facies. The thickness of the Alpine formation ranges from a feather edge to 400 feet.

The Bonneville shoreline (5,135 - 5,200 feet) is a very prominent topographic feature (plate II), and marks the highest stage of the lake. However, the deposits associated with this conspicuous shoreline are small. These deposits consist primarily of thin beach and embankment gravels. In this report the sediments associated with the Bonneville stage have not been differentiated from the Alpine formation.

Provo Formation

The Provo formation overlies the Alpine formation unconformably, and its shore facies is associated with the Provo stage (4,800 feet).

The shore facies and offshore facies of the Provo formation are quite similar to those of the Alpine formation. However, the volume of the shore facies of the Provo formation is far greater than that of the Alpine. These deposits are mostly in the form of beaches, spits, and deltas. Component pebbles of the Provo beach gravels are much larger than those of the Alpine formation, averaging slightly over two inches in maximum diameter.

Figure 6 shows a turbidity flow deposit of Provo age in the Cook and Osborne gravel pit near Big Cottonwood Canyon. Contorted sand and silt layers, as well as graded bedding, both of which are characteristic of turbidity flow deposits, are clearly displayed.

Strong shore currents have destroyed large portions of Alpine deposits and reworked them into spits of Provo age along the eastern and southeastern margins of the valley. Both the Cottonwood - Draper spit and the Point-of-the-Mountain spit (Plate 1) contain considerable amounts of Alpine sediments. Figure 13 shows a portion of the Cottonwood - Draper spit, exposed in a gravel pit near Draper. Here the spit exhibits well-developed foreset beds. Provo gravels of the Point-of-the-Mountain spit are shown in figure 17.

Deltas are found only in embayment areas. One very conspicuous delta is the City Creek delta (fig. 11), exposed along East Capitol Boulevard, directly north of the Utah State Capitol. Figure 20 shows a Provo delta lobe exposed in the Reynolds gravel pit near 7800 South Street and 2000 East Street. A similar Alpine delta lobe (fig. 8) is exposed in the Leggett gravel pit south of 7000 South Street near 1400 East Street. This delta lobe is of interest because the exposure is west of the Cottonwood - Draper spit and at a lower elevation.

Since the Provo depositional surface is far more gentle than that of the Alpine formation, the facies change from shore deposits to offshore sediments is more gradual and less conspicuous. The total thickness of the Provo formation ranges from a feather edge to 80 feet.

Post - Provo Sediments

Below the Provo level there are numerous shorelines, some of which have associated shore deposits. These shorelines represent shrinking and rising

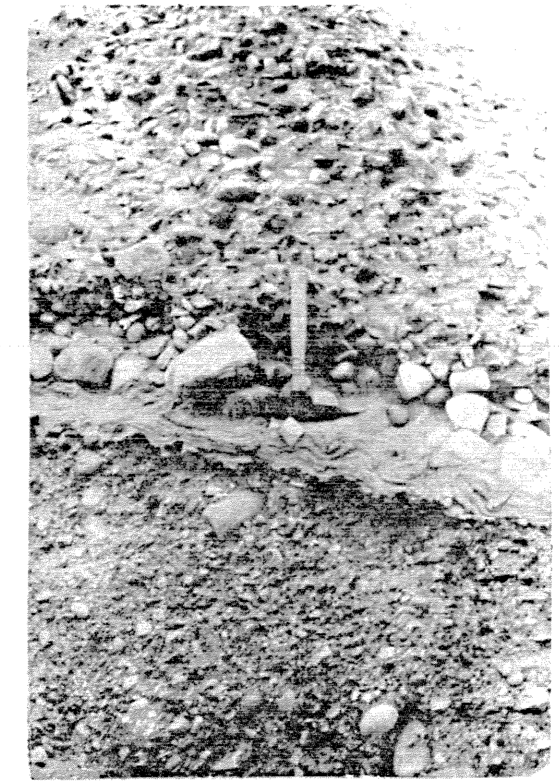
Fig. 4

Alpine embankment gravels near Big Cottonwood Canyon. A. J. Dean Pit (No. 18021)

Fig. 5

Mud-rock flow in Alpine shore gravels near Dry Creek in northeastern lower Jordan Valley. (Pit No. 18008)

Fig. 6



Turbidity flow deposit of Provo age in the Cottonwood-Draper spit near Big Cottonwood Canyon. Cook and Osborne Pit (No. 18023)

Fig. 7

Post - Provo alluvial fan along the west side of the Salt Lake Salient, showing crude stratification.

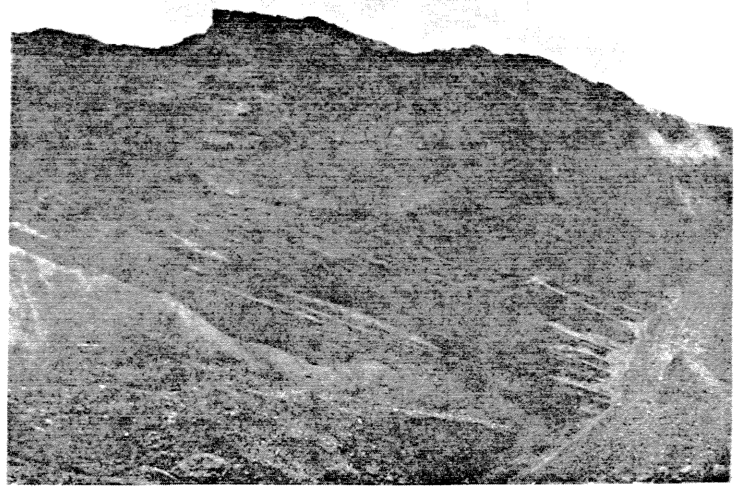
Fig. 8

Alpine delta lobe west of Big Cottonwood Canyon and below the Cottonwood-Draper spit, showing topset and foreset beds. Leggett Pit (No. 18027)

Fig. 9

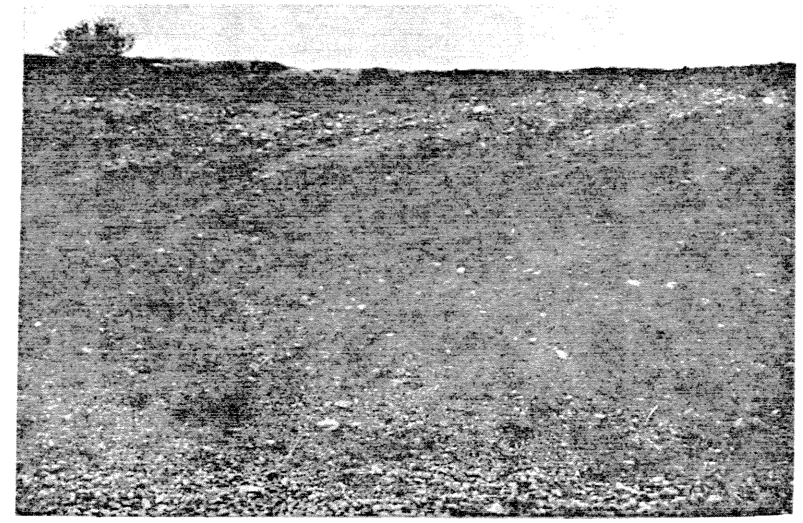
Pre-Lake Bonneville alluvial fan along the west side of City Creek Canyon, showing no stratification. (Pit No. 18010)

Fig. 10



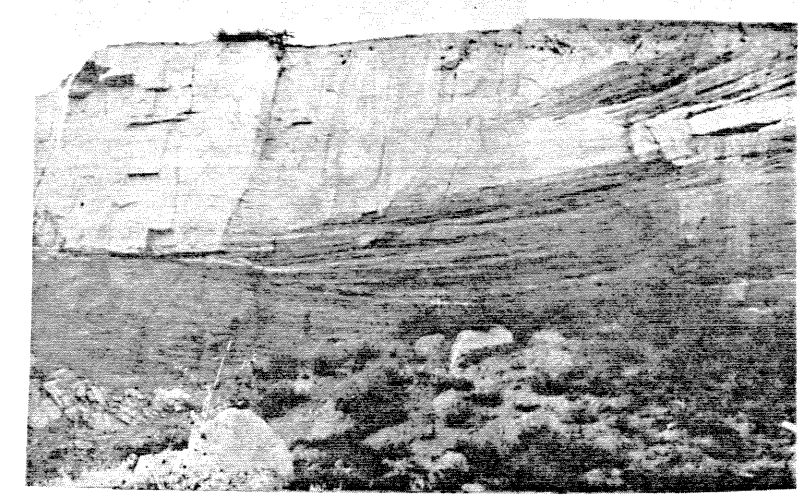
Post - Provo spit, overlain by more recent alluvial fan gravels, exposed along the west side of the Salt Lake Salient. Utah Sand and Gravel Pit (No. 18017)

Fig. 11



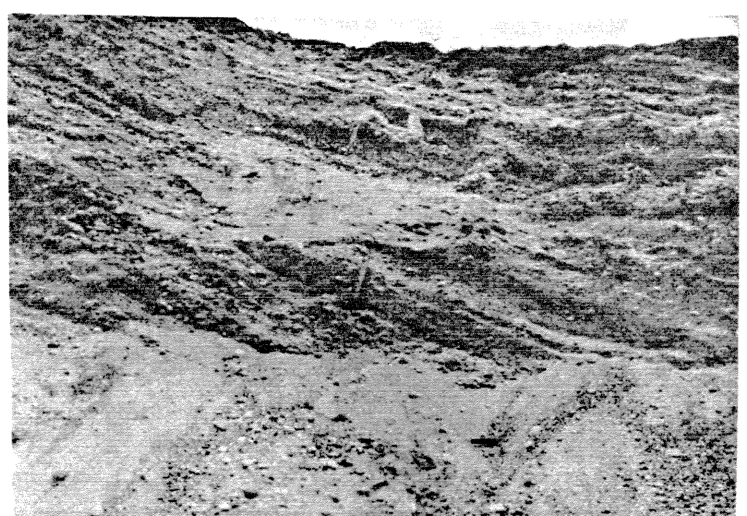
Provo delta north of the Utah State Capitol. Foreset beds are clearly shown.

Fig. 12



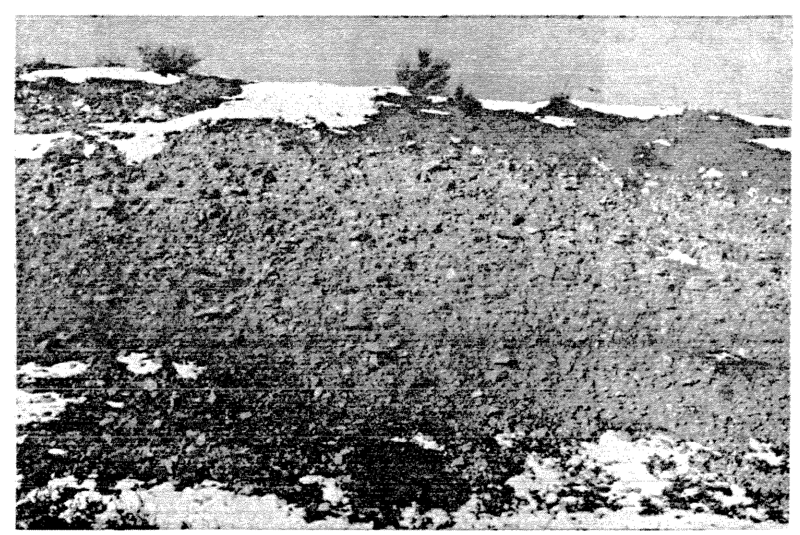
Alpine shore gravels interfingering with offshore sands and silts along the south side of the Salt Lake Salient. Hardman Pit (No. 18007)

Fig. 13



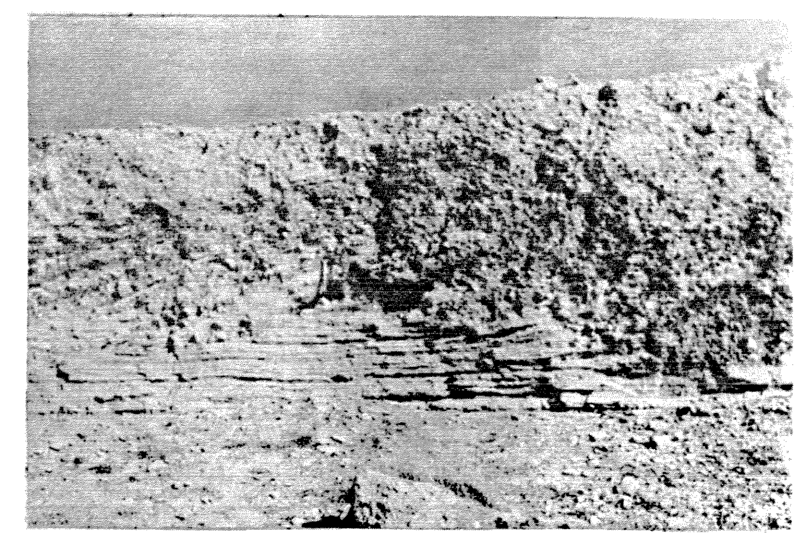
Cottonwood-Draper spit of Provo age, showing well-developed foreset beds near Draper, Layton Realty Pit (No. 18036)

Fig. 14



Harkers fanglomerate of pre-Lake Bonneville age, exposed in a railroad cut near Copperton.

Fig. 15



Coarse Alpine embankment gravels grading rapidly into offshore silts, exposed southwest of Kearns. Elmer Jensen Pit (No. 18062)

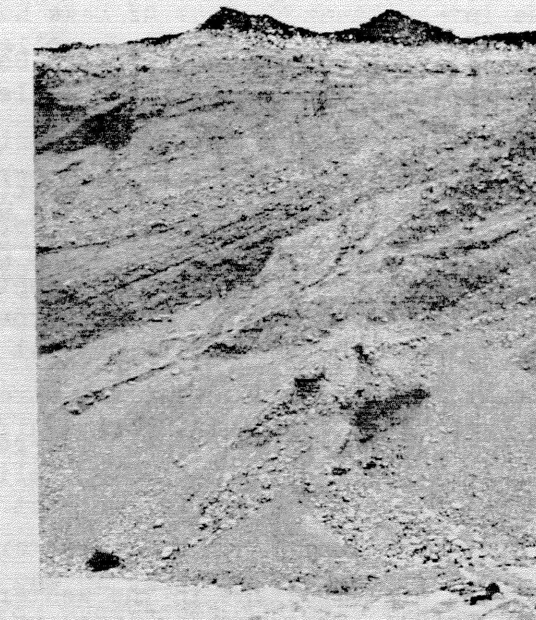
Fig. 16

Post - Provo shore gravels along the west side of the Salt Lake Salient. State Pit (No. 18106)

Fig. 17

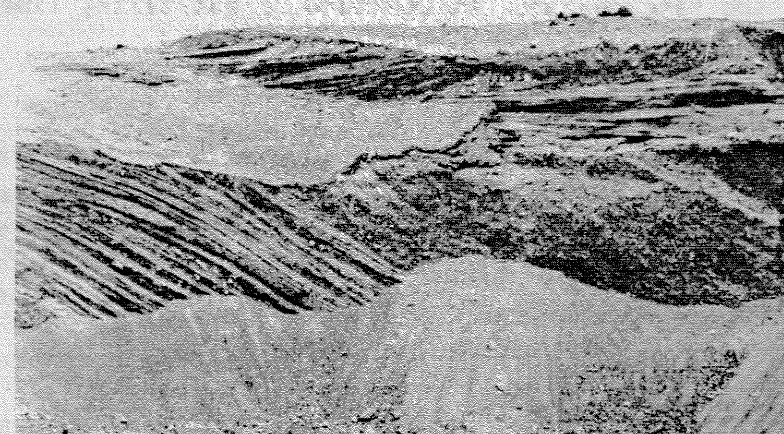
Point-of-the-Mountain spit, showing gravels of Provo age near the Jordan Narrows. Salt Lake Valley Sand and Gravel Pit (No. 18052)

Fig. 18



Post - Provo spit near Kearns, showing topset and foreset beds. Gibbons and Reed Pit (No. 18078)

Fig. 19



Post - Provo spit near Kearns. Here the topset and foreset beds are particularly well displayed. Sorenson Construction Co. Pit (No. 18076)

Fig. 20

Provo delta lobe west of Big Cottonwood Canyon, showing an overwhelming proportion of sand and silt. Reynolds Sand and Gravel Pit (No. 18028)

Fig. 21

Gently sloping beach gravels of post - Provo age near Taylorsville. State Pit (No. 18075) stages during the intermittent retreat of Lake Bonneville. The deposits associated with these minor shorelines have collectively been called "post-Provo".

Beach and embankment gravels are less important in the post-Provo sediments because of relatively low relief. However, where post-Provo shorelines impinge on the mountain fronts, the shore gravels are of considerable volume. Along the north end of the Oquirrh Mountains and along the west side of the Salt Lake Salient (fig. 16), the post-Provo shore gravels are especially important. Many of these shore deposits consist of reworked Alpine and Provo sediments.

Several alluvial fans with associated mud-rock flow deposits are well exposed along the west side of the Salt Lake Salient. One such alluvial fan (fig. 7) shows crude stratification, in contrast to a pre-Lake Bonneville fan (fig. 9) in City Creek Canyon.

Post-Provo spits are important in the western part of the lower Jordan Valley, particularly in the Kearns area. Figures 18 and 19 show topset and foreset beds of a spit east of Kearns. Another post-Provo spit is exposed in the Utah Sand and Gravel pit in North Salt Lake City (fig. 10). Here the foreset beds of the spit are overlain by a more recent alluvial fan.

The offshore facies of the post-Provo sediments, which are similar to those of the Alpine and Provo, have to a great extent been reworked by the Jordan River and its tributaries.

GEOLOGY OF THE UNCONSOLIDATED SEDIMENTS IN THE LOWER JORDAN VALLEY

Sand and Gravel Deposits

The major sand and gravel deposits in the lower Jordan Valley include the following: (1) deposits associated with the different shorelines of Lake Bonneville; (2) stream terraces, formed by streams breaching and redepositing the shore gravels of the lake; (3) sand dunes near and adjacent to some of the Provo spits; and (4) mud-rock flow deposits and alluvial fans at the mouth of some of the canyons.

The shore and nearshore deposits of the Alpine, Provo, and post-Provo stages can be divided into the following types:

(a) Beach gravels, formed along gently sloping shore areas by wave action. The beach gravels are usually well-rounded, and often exhibit a characteristic discoidal shape. The size sorting is excellent.

(b) Embankment gravels, which are similar to beach gravels, are formed along steeply sloping shore areas in comparatively deep water. The embankment gravels are formed by swollen canyon streams dumping their load into the shore area during cloudburst floods.

(c) Spits and bars, formed along the shore by littoral currents. Spits are often found downcurrent from a protruding mass of bedrock, disturbing the regular line of the lake shore. The large Cottonwood-Draper spit and Point-of-the-Mountain spit are of this type. Bars commonly form as barriers built across the mouths of embayments. Sorting in both the spits and bars is good.

(d) Deltas, built by streams in protected embayment areas of the lake. Deltas form when the lake currents are not strong enough to rework the sediments carried into the lake by stream action. Deltas occur along the south side of the Salt Lake Salient, in the northern and northeastern part of the valley. Sorting is good to excellent.

Stream terraces are found along some of the channels of the creeks flowing into the lower Jordan Valley. These terraces are usually situated quite high above the present stream channels, and are therefore often confused with shorelines. The gravels of the stream terraces consist, for the most part, of reworked shore gravels. These terrace gravels are especially important in the southeastern part of the valley.

Sand dunes occur in several areas of the lower Jordan Valley. East of the Evaporation Ponds spit (Plate II), there are a few small post-Provo spits with associated sand dunes. West of the Cottonwood-Draper spit and north of Dry Creek and Little Cottonwood Creek similar sand dunes are found. The sand is in large measure derived from the higher Provo spits, and consists of wind-blown sand.

Alluvial fans are built at the mouths of many of the canyons by streams draining the mountains that surround the lower Jordan Valley. Mud-rock flow deposits may be important constituents of alluvial fans. However, by themselves they consist of unsorted material ranging from silt and clay to very large boulders. Alluvial fans and mud-rock flows are common along the Salt Lake Salient.

Two other types of sand and gravel deposits are the glacial moraines near Little Cottonwood and Bells Canyons and the Tertiary Harkers fanglomerate. The moraines consist of mounds of unsorted material, ranging from boulders to clay. The Harkers fanglomerate makes up the major portion of the eastern foothills of the Oquirrh Mountains, and consists of a series of coalescing alluvial fans. The gravels of the fanglomerate are composed of quartzite, limestone, and extrusive volcanics.

Use of Sand and Gravel

The rock types comprising the different sand and gravel deposits of the lower Jordan Valley, together with their gradation, determine to a large extent the uses for which the gravels are suitable. Although gradation can be controlled by crushing, practical limitations exist for each particular deposit.

Gravels used for the manufacture of portland cement concrete must be highly resistant to physical and chemical alterations. The extrusive volcanics and some of the cherts that occur in the gravels in the southern and western portion of the valley are deleteriously reactive with alkali cements. These rock types are therefore less desirable for concrete aggregate, unless cements low in alkali content are used. In addition, the extrusive volcanics are usually quite porous and therefore susceptible to deterioration caused by freezing and thawing. Some of the quartz monzonite, derived from the Little Cottonwood stock, is badly weathered and will crumble readily. This "rotted" quartz monzonite occurs in many gravel deposits along the Wasatch front in the southeastern part of the lower Jordan Valley. Schists derived both from the Farmington complex and Little Willow series, are usually not acceptable for concrete aggregate because of their undesirable cleavage. These schists are found in the gravels along the west side of the Salt Lake Salient and along the Wasatch Mountains in the southeastern part of the valley.

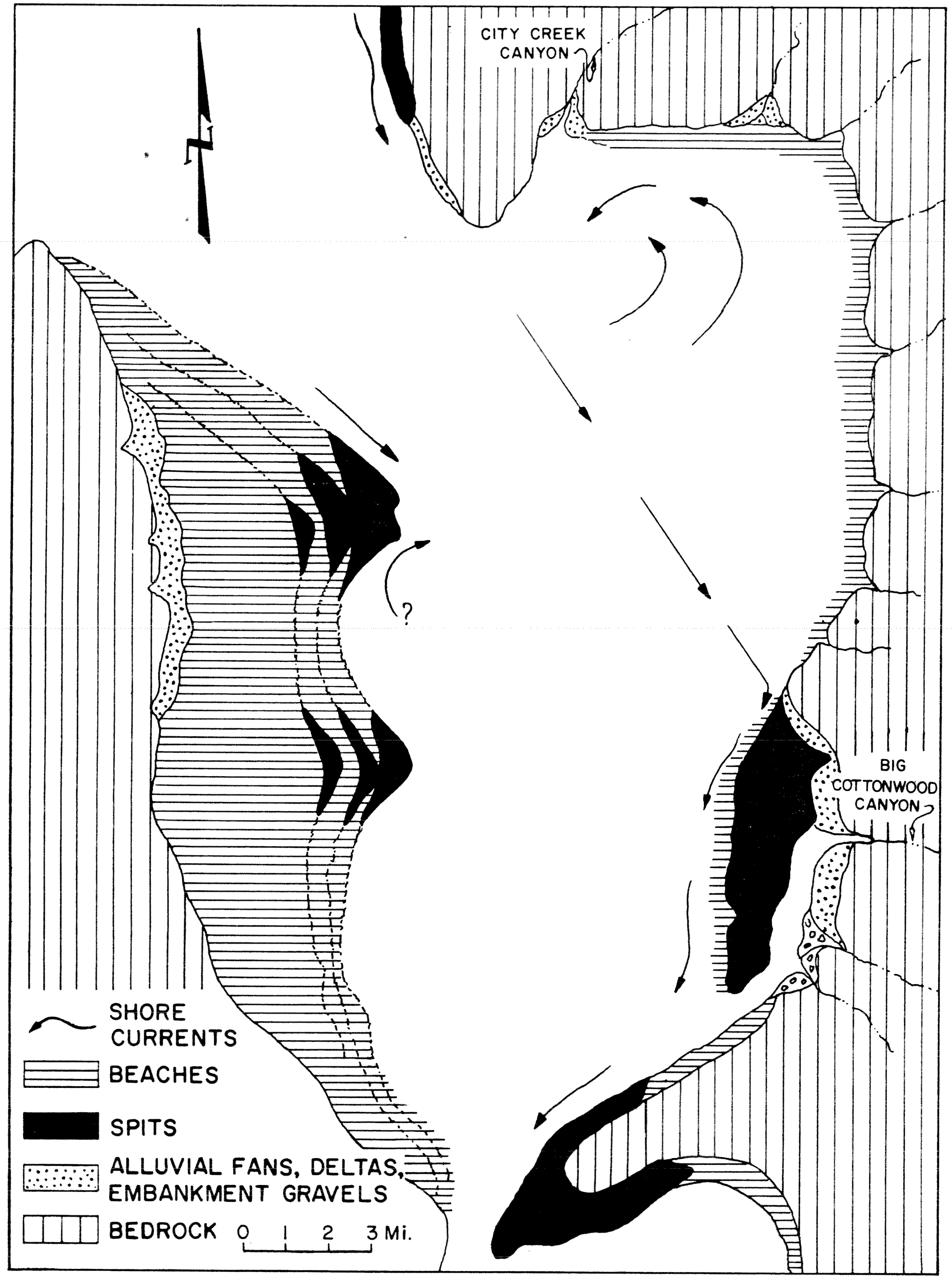


Plate I GENERALIZED SKETCH OF JORDAN VALLEY, UTAH, SHOWING PRINCIPAL TYPES OF SAND & GRAVEL DEPOSITS.

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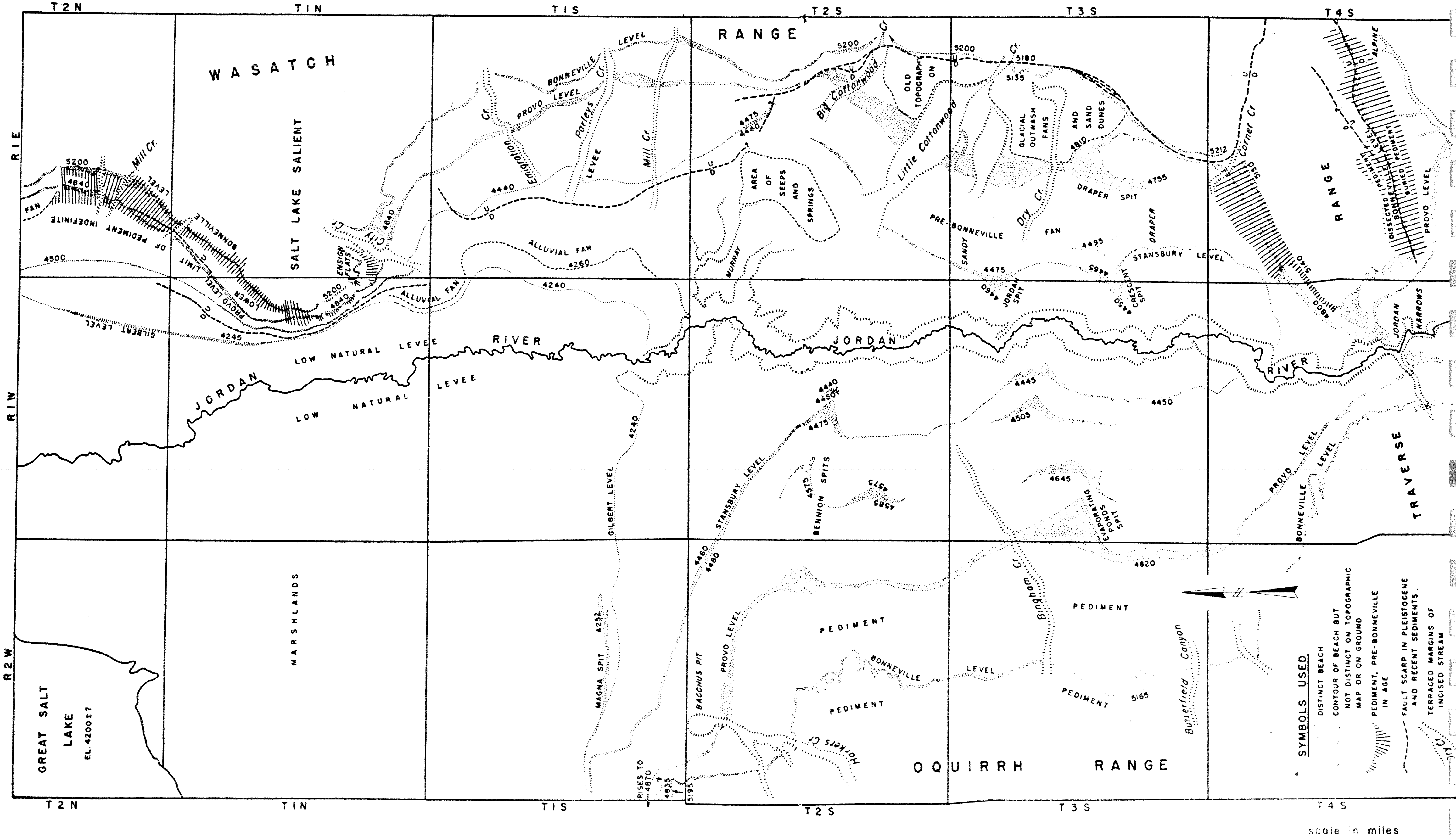

Plate II PRINCIPAL GEOMORPHIC FEATURES OF THE LOWER JORDAN VALLEY (after Eardley, et. al., 1957)

T E S T   D A T A   S H E E T

BG = Base Gravel   SG = Surface Gravel   CA = Concrete Aggregate

NOTE: Borrow Sieve Analysis on Material Passing 3"

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
	Legal Description									Kind and Percent of Material				Representative Sample																	
																		Sieve Analysis % Passing (After Crushing to 1" Max.)							Immersion Compression Avg. P.S.I.			Sodium Sulphate Loss			
																									Lime						
Pit or Site Number	Township	Range	Section	Quarter Section	Quarter of Quarter Section	P = Private, C = Commercial, Co = County, F = Federal, S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	wo/	w/	Range in Depth of Overburden (ft.)	+4	-4	Abrasion 500 Rev.	Thickness of Material (ft.)
18001	1S	2E	19	NW	SW	City	Salt Lake City Corp.	BG, SG	15,000					Cut Bank	18-25	19.6	1.8	100.0	92.8	78.9	44.7	34.6	15.8		25	52.3	0-3	2.0	4.3	26.0	40
18002	1S	1E	23	NE	SW	P	Parley's Grazing Association	BG, SG	50,000					Cut Bank	20-30	18.3	N.P.	100.0	98.7	95.7	67.3	36.3	7.7		160	212	0-3	8.0	12.2	32.8	30
18003	1S	1E	25	SW	SW	City	Board of Education	BG, SG	50,000					Cut Bank	5-15	13.6	N.P.	100.0	89.1	65.2	17.9	4.8	1.5				0-3			20.2	45
18004	2S	1E	11	NE	SW	C	Gibbons & Reed	BG, SG, CA	500,000					Cut Bank	0-15	17.1	N.P.	100.0	96.8	85.8	55.0	37.1	6.8				0-3			25.2	200
18005	1N	1E	33	NW	NW	P	Virginia Heights Inc.	BG, SG	10,000					Cut Bank	5-20	23.7	N.P.	100.0	91.3	73.3	31.7	20.8	3.3				0-2			22.4	20
18006	1N	1E	33	NW	NW	P	Virginia Heights Inc.	BG, SG	8,000					Cut Bank	0-15	21.3	N.P.	100.0	84.2	58.0	33.2	28.3	8.2				1-3			19.2	15
18007	1N	1E	32	NE	NW	City	Board of Education	SG, CA	300,000					Cut Bank	10-20	19.6	N.P.	100.0	86.2	61.8	38.5	32.0	7.7				0-3			20.5	30
18008	1N	1E	33	SE	NE	F	U. S. Army Fort Douglas	BG, SG	16,000					Cut Bank	0-10	20.2	N.P.	100.0	89.1	66.8	33.0	24.1	10.2				1-3			21.0	10
18009	1N	1E	33	NE	SE	P, F	U.S. Army & Bonneville-on-Hill	BG, SG	30,000					Cut Bank	0-15	20.7	N.P.	100.0	96.0	82.6	44.6	32.5	8.4				0			18.0	15
18010	1N	1E	30	SW	SE	City	Salt Lake City Corp.	BG, SG	75,000					Cut Bank	0-12	20.6	N.P.	100.0	90.0	63.9	32.2	23.4	7.1				0-3			26.0	30
18011	1N	1E	30	SE	SW	City	S. L. C. Corp.	BG, SG	100.000					Cut Bank	20-35	20.7	N.P.	100.0	81.7	49.2	25.4	18.4	4.2				0-3			25.4	60
18012	1S	1E	11	NW	SW	S	State of Utah	BG, SG	30,000					Cut Bank	0-6	19.3	N.P.	100.0	90.5	72.3	35.2	21.4	4.1				3-5			27.5	6
18013	1N	1W	25	SE	NW	City	Salt Lake City Corp.	BG, SG	100,000					Cut Bank	20-30	21.2	N.P.	100.0	86.6	62.0	31.7	25.0	2.9				0			18.5	60
18014	1N	1W	25	NW	NE	City	S. L. C. Corp.	BG, SG	20,000					Cut Bank	0-15	17.2	N.P.	100.0	77.7	60.6	30.6	23.4	8.9				0			23.0	20
18015	1N	1E	31	NW	NW	P, S	State Road Commission et al	BG, SG	20,000					Cut Bank	0-15	23.3	N.P.	100.0	90.2	71.8	45.9	35.6	3.5				0-3			22.6	15
18016	1N	1W	23	SE	E	C	W.W. Gardner & Gibbons & Reed	BG, SG, CA	600,000					Cut Bank	5-20	18.9	N.P.	100.0	85.8	58.7	44.8	29.6	8.6		147	210	0			20.4	30
18017	1N	1W	23	NE		C	Utah Sand & Gravel	BG, SG, CA	2,500,000					Cut Bank	20-35	20.3	N.P.	100.0	91.0	71.7	32.8	17.9	2.6				0	4.8	1.3	23.0	45
18018	1N	1W	14	SE	SW	S	State Road Commission		80,000					Cut Bank	0-10	23.8	N.P.	100.0	81.2	50.9	12.8	7.4	2.6				0-3			23.6	10
18019	2S	1E	23	SE	E^2	C	Walker Sand and Gravel	BG, SG, CA	5,000,000					Cut Bank	5-20	16.3	N.P.	100.0	91.2	68.9	42.4	33.5	7.2		0	280	0	1.0	4.5	24.4	60
18020	2S	1E	23	NE	SE	P	Wasatch Rock	BG, SG	100,000					Cut Bank	0-20	21.3	N.P.	100.0	88.8	63.5	31.1	23.7	2.8				0-6			21.0	30
18021	2S	1E	23	SE	NE	C	A. J. Dean and Sons	BG, SG, CA	150,000					Cut Bank	20-30	20.5	N.P.	100.0	88.9	67.6	42.5	35.6	5.0				0-3			18.2	45
18022	2S	1E	14	SE	SW	C	Harper-Jackson	BG, SG, CA	8,000,000					Cut Bank	30-45	17.3	N.P.	100.0	87.2	55.3	24.9	12.2	3.1				0-3	0.10	1.4	22.1	60
18023	2S	1E	23	NE	NW	C	Cook-Osborne	BG, SG, CA	875,000					Cut Bank	20-35	17.7	N.P.	100.0	78.5	47.4	25.4	21.7	5.2				0-3			16.9	60

LOCATION: Pit or Site Number	Legal Description: Township	Range	Section	Quarter Section	Quarter of Quarter Section	OWNERSHIP: P = Private, C = Commercial, Co = County, F = Federal, S = State	Owner	MATERIAL: Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material: Gravel	Coarse Sand	Fine Sand	Clay and Silt	TEST DATA: Representative Sample: Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.): 1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I. Lime wo/	w/	Range in Depth of Overburden (ft.)	Sodium Sulphate Loss +4	-4	Abrasion 500 Rev.	Thickness of Material (ft.)
18024	2S	1E	23	NE	SW	C	Wasatch Rock	BG, SG, CA	735,000					Cut Bank	20-35	16.6	N.P.	100.0	87.4	61.0	33.0	21.2	4.5				3-5			19.9	45
18025	2S	1E	23	SW	NW	C	Utah Sand & Gravel	BG, SG, CA	2,880,000					Cut Bank	40-50	19.3	N.P.	100.0	90.1	65.4	38.0	29.8	3.2				0-3	2.8	2.8	19.8	60
18026	2S	1E	23	NW	S^2	C	Southeast Gravel Company	BG, SG, CA	5,760,000					Cut Bank	30-40	20.6	N.P.	100.0	95.6	84.6	59.9	48.3	8.1				0	3.4		24.3	60
18027	2S	1E	21	SW	S^2	C	Leggett	SG	500,000					Cut Bank	0-15	24.3	N.P.	100.0	94.0	82.9	58.2	46.8	12.1				0-3			33.8	45
18028	2S	1E	27	SW	S^2	C	Reynolds Sand & Gravel	BG, SG, CA	5,760,000					Cut Bank	20-35	20.0	N.P.	100.0	91.6	77.1	48.3	38.6	8.5				0	1.4	3.2	23.8	60
18029	3S	1E	5	SE	SW	P	Virginia Hobush	BG, SG	900,000					Cut B. Talus	20-40	26.1	N.P.	100.0	94.9	85.2	61.4	44.8	1.4				0-3	4.62	2.24	30.8	45
18030	3S	1E	5	NE	NW	City	Midvale City Corp.	SG	300,000					Cut B. Talus	10-30	22.0	N.P.	100.0	96.4	87.5	65.8	55.9	2.8				0-3	2.3	1.4	37.0	45
18031	3S	1E	15	SW	SW	P	L.S. Shawler	BG, SG	50,000					Cut Bank	0-15	26.3	N.P.	100.0	89.7	71.0	35.2	27.4	3.5				0-3			21.3	15
18032	2S	1E	28	SW	SW	P	C.R. Forbush	BG, SG	50,000					Cut B. Talus	20-40	26.2	N.P.	100.0	95.8	84.2	60.5	52.0	2.9				0			38.1	60
18033	3S	1E	5	SE	SE	Co.	Salt Lake County	BG, SG	800,000					Cut Bank	25-35	23.6	N.P.	100.0	93.9	81.2	49.8	29.9	0.8				0-3			21.7	40
18034	3S	1E	8	NE	NE	City	Sandy City Corp.	SG	600,000					Cut B. Talus	0-30	20.6	N.P.	100.0	95.7	88.8	73.6	67.0	4.5				0			35.3	30
18035	3S	1E	22	NW		P	Security Title et al.	SG	30,000					Cut B. Talus	0-18	16.8	N.P.	100.0	99.3	98.3	87.9	57.3	3.8				3-6			28.6	18
18036	3S	1E	29	NE	N^2	C	Layton Realty	BG, SG, CA	1,500,000					Cut Bank	10-30	22.4	N.P.	100.0	91.8	80.4	52.5	42.0	1.9				0-3			33.2	30
18037	3S	1E	29	NE	S^2	P	Layton Realty	CA, B	2,500,000	12.8	42.4	38.1	6.7	Cut Bank	0-15	17.0	N.P.	97.2	95.8		91.2	87.2	6.7	A-1-b(0)			1-3				30
18038	2S	1E	20	SE	S^2	S	State Road Commission	CA, B	3,840,000	1.2	70.7	24.4	3.7	Cut Bank	0-15	18.4	N.P.				100.0	98.8	3.7	A-3 (0)			0-3				20
18039	3S	1E	29	SE	NW	Co.	Jordan School District	B	450,000	0.3	29.8	63.2	6.7	Cut B. Talus	20-35	21.8	N.P.				100.0	99.7	6.7	A-1-b(0)			0-3				45
18040	3S	1E	29	S^2		P	Draperville Corp and E. Carlquist	B	50,000	2.0	37.2	45.7	15.1	Cut B. Talus	0-3	20.4	N.P.				100.0	98.0	15.1	A-2-4(0)			0-3				30
18041	3S	1E	4	SE	NE	P	Robert Russell	BG, SG	600,000					Cut B. Talus	20-40	18.3	N.P.	100.0	93.8	82.4	59.6	46.5	2.0				0-3			30.8	30
18042	3S	1E	28	SW	SW	P	Dan Smith	BG, SG	360,000					Cut Bank	10-25	21.8	N.P.	100.0	88.2	67.7	34.8	24.8	4.4				0-3			29.0	60
18043	3S	1E	28	SW	SW	P	Ned Smith	B	370,000	7.0	76.6	12.9	3.5	Cut B. Talus	5-20	16.8	N.P.				100.0	93.0	3.5	A-1-b(0)			0-3				45
18044	3S	1E	33	NE	SW	P	A.L. Anderson et al.	B	1,000,000	13.5	62.0	14.6	9.9	Cut Bank	20-30	15.5	N.P.		100.0		93.2	86.5	9.9	A-1-b(0)			2-5				30
18045	4S	1W	12	NE	SE	S	State of Utah	BG, SG	100,000					Cut Bank	10-25	21.7	N.P.	100.0	96.8	87.0	61.2	42.9	2.4				0-3			25.0	25
18046	4S	1E	7	W^2		P	F.W. Rideout et al.	BG, SG	1,000,000					Cut Bank	50-60	18.2	N.P.	100.0	95.6	85.5	45.0	26.8	7.3				2-5			32.0	60
18047	4S	1W	13	SW		C	Hansen Lime & Stucco	B	500,000	18.4	34.0	7.9	39.7	Cut Bank	0-15	25.5	N.P.	95.3	92.9		86.2	81.6	39.7	A-4 (0)			0				75
18048	4S	1W	23	NE	E^2	C	Hansen L. & S. Superior Asphalt	BG, SG	600,000					Cut Bank	0-20	22.3	N.P.	100.0	98.1	87.5	43.5	26.0	9.4				0-3			25.4	100
18049	4S	1W	23	SE	E2	C	Amy Dean	BG, SG	1,500,000					Cut B Talus	30-45	24.6	N.P.	100.0	96.1	86.4	57.0	34.7	1.6				0-3			23.0	70
18050	4S	1W	24	NW	SE	P	Utah Sand & Gravel	BG, SG	2,000,000					Cut Bank	0-15	27.2	N.P.	100.0	89.2	68.4	25.1	6.5	3.4				1-3			25.6	15

LOCATION: Pit or Site Number	Legal Description: Township	Range	Section	Quarter Section	Quarter of Quarter Section	OWNERSHIP: P = Private, C = Commercial, Co = County, F = Federal, S = State	Owner	MATERIAL: Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material: Gravel	Coarse Sand	Fine Sand	Clay and Silt	TEST DATA: Representative Sample: Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.): 1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.: Lime wo/	Lime w/	Range in Depth of Overburden (ft.)	Sodium Sulphate Loss: +4	-4	Abrasion 500 Rev.	Thickness of Material (ft.)
18051	4S	1W	24	SW	NW	S	State of Utah	BG, SG	2,500,000					Cut Bank	0-15	19.5	N.P.	100.0	96.1	83.7	31.1	7.9	0.6				0-3			27.8	15
18052	4S	1W	23			C	Salt Lake Valley Gravel Co.	BG,SG,CA	10,000,000					Cut Bank	20-35	19.3	N.P.	100.0	94.1	82.2	50.0	25.0	2.6				0-5	4.40	2.16	23.8	100
18053	4S	1W	14	SE	SE	P	Rowland Williams et al.	BG,SG,CA	100,000					Cut Bank	0-15	19.7	N.P.	100.0	94.0	80.1	45.6	28.2	3.7		207	361	0-3	5.1	6.5	21.2	15
18054	4S	1W	10	SW	N^2	P	Forrest W. Parry	SG	200,000					Cut B. Talus	0-15	27.5	N.P.	100.0	97.2	91.7	75.9	51.9	0.9				0-3			23.0	15
18055	3S	1W	26	SE		P	Joseph A. Stay	B	500,000	0.8	12.0	58.0	29.2	Cut Bank	0-10	17.4	N.P.	100.0			100.0	99.2	29.2	A-2-4(0)			0				30
18056	3S	1W	20	SE	NW	P1,Co	Salt Lake Co. & David Jones	BG, SG	200,000					Cut Bank	0-15	20.8	N.P.	100.0	83.1	51.6	16.3	10.5	4.0				3-5			20.6	15
18057	3S	1W	20	NE	SW	P	Gustav Lucas	BG, SG	100,000					Cut Bank	0-6	18.8	N.P.	100.0	84.3	55.7	19.7	11.8	2.8				1-3			23.4	15
18058	3S	1W	16	NW	N^2	P	Robert Palmer	BG, SG	200,000					Cut Bank	0-10	20.5	N.P.	100.0	92.9	76.2	33.5	18.0	3.1				1-3			23.8	15
18059	3S	2W	8	SE	S^2	P	Kennecott Copper Corp.	BG, SG	200,000					Cut Bank	5-15	21.9	N.P.	100.0	91.4	69.5	29.3	18.9	4.4				0			27.0	30
18060	3S	1W	12	NE	NW	P	Boynton	CA, B	200,000	14.8	78.1	4.2	2.9	Cut Bank	0-15	20.6	N.P.	99.3	98.6		92.0	85.2	2.9	A-1-b-(0)			0-3				15
18061	3S	1W	4	NW	NW	P	Frances W. Kirkham	BG, SG	40,000					Cut Bank	0-6	21.5	N.P.	100.0	90.2	66.7	35.5	28.4	12.7				0-3			23.6	6
18062	2S	2W	26	SE	NW	C	Elmer N. Jensen	BG, SG	200,000					Cut Bank	0-10	19.9	N.P.	100.0	90.9	71.7	28.7	15.9	4.5				1-2			21.0	30
18063	3S	2W	24	SE	SW	P	Kennecott Copper Corp.	BG, SG	70,000					Cut Bank	0-10	27.7	6.4	100.0	84.4	55.8	19.4	14.3	8.2				2-4			26.0	10
18064	3S	2W	2	SE	NE	P	Calvin J. Spratling	BG, SG	50,000					Cut Bank	0-10	21.3	N.P.	100.0	89.4	64.8	23.4	16.6	6.0				0-2			24.0	10
18065	2S	2W	27	SE	SW	P	William P. Spratling et al	BG, SG	14,000					Cut Bank	5-20	25.2	3.0	100.0	88.5	60.9	18.9	10.7	4.5				1-3			27.0	20
18066	2S	2W	33	NE	NE	P	William P. Spratling et al	BG, SG	150,000					Cut Bank	0-15	21.3	N.P.	100.0	86.8	61.8	24.9	20.2	5.3				0-3			25.4	30
18067	3S	2W	16	SE	NE	P	James H. Wood et al.	BG, SG	50,000					Cut B. Talus	0-15	19.2	N.P.	100.0	85.0	57.1	18.4	11.7	2.0				0-1			25.4	15
18068	2S	2W	16	NW	SW	P	Arnold H. Petersen	BG, SG	60,000					Cut Bank	0-10	30.6	7.4	100.0	91.1	67.4	22.6	15.1	4.4				0-2			26.4	15
18069	2S	2W	14	NW	NW	P	Chris M. Rushton	BG, SG	300,000					Cut Bank	5-15	20.6	N.P.	100.0	94.0	76.5	23.7	15.8	4.5				0-2			22.7	30
18070	1S	2W	34	SW	SW	S	State of Utah	BG, SG	75,000					Cut Bank	0-15	18.7	N.P.	100.0	88.6	62.6	19.3	11.5	4.1				0-3			26.2	15
18071	1S	2W	19	SW	S^2	P	Kennecott Copper Corp.	B	450,000	12.2	7.6	62.2	18.0	Cut B. Talus	0-20	19.1	N.P.	99.5	99.0		91.6	87.8	18.0	A-2-4(0)			0-3				45
18072	2S	2W	13	SW	NE	C	Utah Sand & Gravel	BG, SG	450,000					Cut Bank	0-15	19.6	N.P.	100.0	83.2	53.2	15.5	9.7	1.4				0-3			21.0	45
18073	2S	1W	18	SE	W^2	P	Abram Barker	BG, SG	600,000					Cut Bank	0-10	20.3	N.P.	100.0	90.8	73.1	36.1	14.5	3.3				1-3			20.0	30
18074	2S	1W	4	SW	W^2	P	Harold Breitling	BG, SG	200,000					Cut Bank	5-15	20.2	N.P.	100.0	89.0	66.3	33.4	18.8	1.4				1-3			20.8	45
18075	2S	1W	4	SW	E^2	S	State of Utah	BG, SG	250,000					Cut Bank	5-20	20.3	N.P.	100.0	88.5	64.3	20.1	11.5	2.1		174	210	1-10			22.0	30
18076	2S	1W	8	SW	SE	C	Sorenson Construction Co.	BG, SG	1,920,000					Cut Bank	5-15	19.7	N.P.	100.0	93.3	75.0	31.1	19.3	3.6				1-2	1.4		21.2	40
18077	2S	1W	17	SE	NE	C	Snider Rock Products	BG, SG	768,000					Cut Bank	10-20	21.3	N.P.	100.0	83.4	52.2	14.1	10.7	6.1				0-1			21.8	40

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
	Legal Description									Kind and Percent of Material				Representative Sample																	
																		Sieve Analysis % Passing (After Crushing to 1" Max.)							Immersion Compression Avg. P.S.I.			Sodium Sulphate Loss			
Pit or Site Number	Township	Range	Section	Quarter Section	Quarter of Quarter Section	P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	Lime wo/	Lime w/	Range in Depth of Overburden (ft.)	+4	-4	Abrasion 500 Rev.	Thickness of Material (ft.)
18078	2S	1W	17	NW	SE	C	Gibbons & Reed	BG, SG	2,500,000					Cut Bank	5-20	19.5	N.P.	100.0	89.2	68.1	28.5	12.5	2.2				0-3	0.32	3.1	20.4	40
18079	2S	1W	16	NW	SW	C	R.C.Blake & Ut. Irrigation	BG, SG	3,200,000					Cut Bank	0-15	18.5	N.P.	100.0	85.9	53.4	18.5	12.6	2.1				2-5			20.6	40
18080	2S	1W	17	SE	SE	Co	Salt Lake Co.	BG, SG	320,000					Cut Bank	0-10	19.9	N.P.	100.0	85.9	64.2	26.6	11.9	3.2				0-2	3.0		22.6	40
18081	2S	1W	17	SE	NW	S	State of Utah	BG, SG	6,080,000					Cut Bank	5-20	19.8	N.P.	100.0	87.3	61.5	19.8	9.6	1.8		210	256	2	0.32	3.1	21.6	40
18082	2S	1W	17	NE	SE	City	Murray City	BG, SG	320,000					Cut Bank	0-10	19.2	N.P.	100.0	87.1	65.0	20.3	7.4	1.3				0-3			21.2	30
18083	2S	1W	17	NE	NE	P	Shirley and Ruth Reynolds	BG, SG	100,000					Cut Bank	0-15	19.2	N.P.	100.0	84.1	58.1	21.1	12.8	2.6				2-4			21.6	40
18084	2S	1W	17	NE	NE	S	State of Utah	BG, SG	50,000					Cut Bank	10-20	18.5	N.P.	100.0	85.6	55.8	18.0	13.1	2.9				1-3			24.0	40
18085	1S	2W	31	NE	NW	P	Kennecott Copper Corp.	BG, SG	25,000					Cut Bank	0-10	19.6	N.P.	100.0	90.9	69.9	29.3	15.7	1.7				0-2			20.0	20
18086	2S	1W	15	SW	SE	Co	Salt Lake County	BG, SG	MINED OUT					NO	SAM	PLE											?				
18087	2S	1W	10	SW	NW	City, P	Murray City et al.	BG, SG	MINED OUT					NO	SAM	PLE											?				
18088	2S	2W	1	SE	SE	P	P.H.Stromberg et al.	BG, SG	5,000					Cut Bank	0-10	20.4	N.P.	100.0	97.4	88.4	50.2	36.7	4.6				4-8			24.6	15
18089	2S	2W	11	NE	S^2	P	Youngren	BG, SG	300,000					Cut Bank	5-20	24.7	N.P.	100.0	92.5	75.3	37.4	22.8	4.8				1-4			24.0	30
18090	2S	2W	9	SW	SE	P	Hercules Powder Co.	BG, SG	300,000					Cut Bank	0-15	20.9	N.P.	100.0	86.5	64.2	30.6	21.5	4.9				1-3			20.0	30
18091	2S	2W	8	NE	SW	P	Hercules Powder Co.	SG	75,000					Cut Bank	0-15	21.0	N.P.	100.0	86.7	59.8	19.8	11.5	2.9				0-2			20.0	15
18092	2S	2W	9	SE	NE	P	Hercules Powder Co.	BG, SG	200,000					Cut Bank	10-25	20.2	N.P.	100.0	84.7	59.1	17.9	10.7	2.4				1-3			27.0	30
18093	2S	2W	5	NE	E^2	P	Hercules Powder Co.	BG, SG	MINED OUT					NO	SAM	PLE											?				
18094	1S	3W	21	NE	NW	P	Kennecott Copper Corp.	BG, SG	250,000	63.6	5.6	20.3	10.5	Cut Bank	0-15	16.9	N.P.	94.6	89.4		47.4	36.4	10.5	A-1-a(0)			0-2			25.1	30
18095	1S	3W	21	NE	NW	P	Kennecott Copper Corp.	BG, SG	10,000	42.4	17.0	27.0	13.6	Cut Bank	0-10	19.5	N.P.	99.3	98.6		70.8	57.6	13.6	A-1-b(0)			0				25
18096	1S	3W	23	SW	NW	P	Kennecott Copper Corp.	BG, SG	50,000					Cut Bank	5-15	20.3	N.P.	100.0	87.1	63.3	26.7	18.8	8.2				0-2			18.0	20
18097	1S	3W	22	SE	NE	P	Kennecott Copper Corp.	BG, SG	1,000,000					Cut Bank	5-12	17.4	N.P.	100.0	91.1	67.6	23.3	13.8	2.4				0			23.4	300
18098	1S	3W	23	SW	E^2	P	Kennecott Copper Corp.	BG, SG	600,000					Cut Bank	2-12	17.7	N.P.	100.0	90.8	68.4	24.1	15.1	2.1				0-2			26.0	200
18099	1S	3W	22	SW		P	Kennecott Copper Corp.	BG, SG	2,000,000					Cut Bank	0-10	17.9	N.P.	100.0	88.1	63.8	18.0	9.9	1.9				0-3			22.0	200
18100	1S	3W	22	NW	SE	P	Kennecott Copper Corp.	BG, SG	500,000					Cut Bank	5-14	19.4	N.P.	100.0	90.8	67.7	26.1	16.0	1.8				0-5			22.3	200
18101	1S	2E	17	NE	NE	P	W.B.Richards et al.	BG, SG	16,000					Cut Bank	8-12	17.8	N.P.	100.0	90.0	68.2	33.3	24.4	10.6				0			34.0	20
18102	1S	2E	17	NE	SW	S, P	State Rd.Com. Portland Cement	BG, SG	250,000					Cut Bank	15-20	17.3	N.P.	100.0	89.8	67.8	35.1	26.3	11.5		14	153	0	3.1	3.4	32.0	35
18103	1S	2E	17	SW	NE	S, P	State Rd. Com. S. L. C. Corp.		35,000					Cut Bank	10-15	20.7	N.P.	100.0	87.8	64.2	24.3	15.5	5.2				0			27.0	30
18104	1S	2E	18	SE		S,P	State Rd. Com. et al.		12,000					Cut Bank	10-15	21.7	N.P.	100.0	91.4	70.8	35,2	23.2	7.8				0			23.4	15

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
Pit or Site Number	Legal Description					P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material				Representative Sample										A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.		Range in Depth of Overburden (ft.)	Sodium Sulphate Loss		Abrasion 500 Rev.	Thickness of Material (ft.)
	Township	Range	Section	Quarter Section	Quarter of Quarter Section					Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.)							Lime						
																		1"	3/4"	1/2"	No. 4	No. 10	No. 200		wo/	w/		+4	-4		
18105	3S	2W	28	NE	NW	P	U.S. Smelting and Refining	BG, SG	20,000					Cut Bank	0-15	19.2	N.P.	100.0	91.3	71.3	33.6	18.6	4.1				0			24.0	20
18106	1N	1W	14	NE	SE	S	State of Utah	BG, SG	85,000					Cut Bank	0-13	19.0	N.P.	100.0	60.4	59.6	39.1	30.4	8.4		51	273	0-3	1.6	2.3	23.4	9
18107	1N	2E	35	N^2		City	Salt Lake City Corp.																				0				
18108	2S	1W	23	SW	W^2	P	Dale P. & Dean W. Bateman	B	200,000	0.4	0.5	14.7	84.4	T.H. 3	0-20	26.3	5.1		100.0		99.9	99.6	84.4				0-2				30
18109	1S	1W	35	NW	SE	P	Zion Securities & Thompson	B		3.0	9.0	35.0	53.0	T. H. 1	14-15	22.0	N.P.				100.0	97.0	53.0	A-4(4)			0			32.0	20
18110	3S	1E	5	NE	SW	P	Zion First National Bank	BG, SG	200,000					Back Hoe 4	0-9'	17.0	N.P.	100.0	93.1		62.5	56.5	4.0		289	340	0-2	5.8	4.9	32.0	12
18111	3S	1W	23	NE	E^2	P	Stanley Ganczak	B	650,000	0.9	1.0	7.6	90.5	T.H. 1	0-20	30.4	9.3		100.0		99.3	99.1	90.5	A-4(8)			0				30
18112	2S	1E	29	NE	NE	P	Edward E. Hirst	CA, B	1,000,000	54.7	22.2	22.4	0.7	Cut Bank		24.2	N.P.	68.5			53.3	45.3	0.7	A-1-a			0				50
18113	2S	1W	24	SW	NE	P	Williams	B	180,000	0.5	1.2	13.1	25.2	T.H. 1	0-20	27.3	7.4		100.0		99.9	99.5	85.2	A-4(8)			0-15				20
18114	1N	1W	26	NE	NW	P	Elise Morris and Sons	B	100,000	7.9	1.5	45.0	45.6	Cut Bank	0-6'	20.5	N.P.	98.8	48.3		92.7	92.1	45.6	A-4(2)			0				
18115	3S	1W	11	NE		P	V. Wayne Mumford	B	4,000,000	5.3	17.7	29.5	47.5	T. H. 13	0-20	16.9	N.P.		100.0		99.0	94.7	47.5	A-4(3)			0-1				50
18116	2S	1W	2	SE		P	Barker, Judd, and Nielson	B	MINED OUT					NO SA	MPLE												0				
18117	1S	1E	23	S^2		P	State Road Commission	BG, SG	100,000					Test Hole		20.1	N.P.	100.0	94.2		47.1	33.8	4.3		160	212		8.0	12.2	30.0	
18118	1S	2W	27	NE	NE	P	Toone	B	500,000	25.1	17.3	42.6	15.0	T. H. 11	0-4	15.8	N.P.	97.4	95.0		81.7	74.9	15.0	A-2-4			0-1				5
18119	1S	2W	33	SE		P	Zions First National Trust	BG, SG	500,000					Test Pit 1	0-10	21.1	N.P.	100.0	89.6	72.6	42.8	30.5	8.8				0-2				30
18120	2S	1W	11	SE	SE	P	J.L. Wirthlin Co	B	900,000	0.2	2.9	21.1	75.8	T. H. 4	0-19	26.5	8.5				100.0	99.8	75.8	A-4(8)			0-1				30
18121	2S	1W	14	SE	N^2	P	Brinton & Gregor	BG, SG	200,000					Cut Bank	0-20		N.P.	100.0	86.8			*21.5	2.5				0				20
18122	2S	1W	26	E^2		P	Wesley Syne	BG, SG	1,000,000					Cut Bank	0-20		N.P.	100.0	90.0		46.7	*9.9	0.7		272	282	0	.07	1.4	21.2	50
18123	2S	1W	35	SE	NE	P	U.S. Smelting & Refining Co.	B	1,000,000	0.0	1.1	13.9	85.0	T. H. 3	0-11	25.3	N.P.				100.0	100.0	85.0	A-4(8)			0				20
18124	3S	1W	26	NE	SW	P	Joseph A. Stay	BG, SG	8,000												100.0						0-15				30
18125						P	Hansen-Mt. Jordan Corp.	BG, SG	180,000					T.H. 22	0-20	20.7	N.P.	100.0	98.0			29.8	8.7		207	361	0-1	5.1	6.5	25	20
18126	2S	1W	1	NW	N^2	P	Elias C. Butterfield	B	100,000	1.9	12.7	66.5	18.9	Cut Bank	0-10'	19.4	N.P.					98.1	18.9	A-2-4			0-1				5
18127	1S	2W	14	E^2		S	Fish and Game Commission	B	1,200,000	0.8	5.3	25.3	68.6	Hand Auger	0-5'	25.8	5.9					96.4	18.6	A-4(7)			0				5
18128	1S	1E	11	NE	NE	City	S. L. C. Corp.	B	2,000	68.8	6.7	4.1	20.4	Cut Bank	15-18	29.6	9.5	88.2	44.3			31.2	20.4	A-2-4			0				40
18129	1S	1E	1	NE	SE	City	S. L. C. Corp.	B	250,000	37.2	2.5	26.4	33.9	Cut Bank	2-6	36.0	21.3	80.6	65.7			62.8	33.9	A-2-6(2)			0-½				5
18130	1N	3E	7	SW	NE	City	S. L. C. Corp.	B																							
18131	2S	3E	16	SW	SE	P	John A & Enid P Ward	B																							

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
Pit or Site Number	Legal Description					P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material				Representative Sample										A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.		Range in Depth of Overburden (ft.)	Sodium Sulphate Loss		Abrasion 500 Rev.	Thickness of Material (ft.)
	Township	Range	Section	Quarter Section	Quarter of Quarter Section					Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.)							Lime						
																		1"	3/4"	1/2"	No. 4	No. 10	No. 200		wo/	w/		+4	-4		
18132	2S	3E	17	SE	NE	F	National Forest	BG, SG																							
18133	3S	3E	6	NE	S^2	P	H.C. Bradshaw A.E. Hudson	BG, SG																							
18134	3S	3E	6	SE	NW	P	A.E. Hudson	B																							
18135	3S	1E	12	SE	NW	P	Alva J. Despain	B	300,000									100.0	90.7	70.7	40.4	*30.6	7.8				0-1				20
18136	3S	1E	12	SW	NW	P	Alva J. Despain	Riprap	50,000																						
18137	2S	3E	18	NE	NE	F	National Forest	BG, SG																							
18138	2S	2E	14	SW	SE	F	National Forest																								
18139	1N	2W	31	SW	SW	P	Morton Salt Co.	B	10,000	0.1	1.4	24.0	74.5	Hand Auger	4-7	27.3	13.6					99.9	74.5	A-6 (10)			0-1				4
18140	1S	2W	4	N^2		P	Gossner & Whaler	B	2,000,000	15.6	10.7	22.2	51.5	Hand Auger	1-3	33.0	8.0					84.4	51.5	A-4 (3)			0-1				10
18141	1S	3W	12	NW	W^2	P	Kennecott Copper Corp.	B	10,000	52.4	31.2	5.3	11.1	Cut Bank	0-5	26.2	N.P.	99.6	63.7			47.6	11.1	A-1-a			0-1				5
18142	1S	3W	16	NW	SW	P	Kennecott Copper Corp.	B	10,000	0.6	9.1	79.4	10.9	Cut Bank	0-4	19.3	N.P.					99.4	10.9	A-2-4			0				5
18143	1S	3W	19	NE		P	Kennecott Copper Corp.	B	5,000	36.2	14.2	23.2	26.4	Cut Bank	0-5	18.2	N.P.	84.1	73.3			63.8	26.4	A-2-4			0				7
18144	1S	1E	21	SW	NW	S	State Prison	B	MINED OUT					NO SAMPLE																	
18145	2S	1E	28	E^2		P	Bekkemellon	B	1,000,000+	0.1	25.3	67.3	7.3	Test Hole 1	0-10	18.7	N.P.				100.0	99.9	7.3	A-3			0				15
18146	2S	1E	25	CEN.SEC.		P	Winn and Co. Inc.	BG, SG	1,000,000					Cut Bank	0-20	20.0	N.P.	100.0	91.3	68.8	38.4	*29.3	3.6							33.7	40
18147	1S	1E	26	NW	NE	P	H.D. & E.B. Hansen	BG, SG	MINED OUT					NO SAMPLE																	
18148	2S	1W	11	SE	NW	P	John W. & Ida R. Park	B	200,000	11.4	42.2	42.1	4.3	Cut Bank	0-6	17.1	N.P.	97.5	96.8		94.2	88.6	4.3	A-1-b			0				10
18149	2S	1W	14	SE		P	Brinton and Gregor	B		0.1	0.6	39.2	60.1	Test Hole 1	0-20	20.1	N.P.				100.0	99.9	60.1	A-4(5)			0-2				30
18150	3S	1E	4	W^2		P	E. Williams	BG, SG						Test Hole 8	0-15	15.1	N.P.	100.0	94.1	82.4	64.7		10.9				0-1	2.6	7.8	24.8	30
18151	2S	1E	7	SW	NW	P	W. V. Jacobson	BG, SG	93,000					Cut Bank	0-10		N.P.	88.4	72.3	42.1	10.6	*6.1	0.6				0			22.0	30
18152						P	Portland Cement	BG, SG	200,000					Cut Bank	0-20	18.0	N.P.	100.0	91.0	50.9	16.3	*9.7	1.5			272		0.7	2.2	34.0	
18153						P	Jack C. Jensen	B						Cut Bank	0-40	18.0	N.P.	100.0	94.4	64.1	225	*13.2	2.0		185	296		4.6	4.8	34.0	

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
Pit or Site Number	Legal Description					P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material				Representative Sample										A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.		Depth of Overburden (ft.)	Sodium Sulphate Loss		Abrasion 500 Rev.	Thickness of Material
	Township	Range	Section	Quarter Section	Quarter of Quarter Section					Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.)							Lime			+4	-4		
																		1"	3/4"	1/2"	No. 4	No. 10	No. 200		wo/	w/					

Soil Types

The "Soil Map" of the Salt Lake Area, published by the United States Department of Agriculture, proved to have excellent correlation with known material types in various localities throughout the county. It was, therefore, decided that the "Soil Map" would be used as a basis for the potential aggregate sources in areas not covered in the mapping program conducted for this booklet. It must be remembered, however, that the "Soil Map" was prepared from surveys that only sampled to a depth of six feet below the surface. Different material types are often found at greater depths. This problem has been greatly lessened because the detailed soil types shown on the Department of Agriculture's Soil Map have been generalized into five main soil types on the Potential Sources Map. Any soil type which contains clay has been shown as "clayey soil", even though sand and/or gravel may be present. If clay is absent from a certain soil type, and gravel is the predominant material, it would be shown as "gravely soil"---even though sand may or may not be present. Likewise, a soil type containing no clay, which has sand as the major material type, is mapped as "sandy soil" on the Potential Sources Map---even though gravel may or may not be present. This generalized condensation of the Soil Map should greatly lessen the chances that material below the six foot sampled zone will markedly differ in predominant material type.

Gs

Gravely Soil

Soils containing gravel as the predominant material type. These soils contain no clay, but may or may not contain sand and silt. Areas overlain by these soils should be excellent potential aggregate sources.

Cs

Clayey Soil

Soils in which clay has been found. Clay need not necessarily be the main constituent in these soils, as gravel, sand, and/or silt may or may not be found in clayey soil. Areas overlain by this soil type should be considered for potential borrow material only.

Ss

Sandy Soil

Soils containing sand as the predominant material type. These soils contain no clay, but may or may not contain gravel and silt. Areas overlain by these soils should be considered good potential aggregate sources.

Os

Oölitic Sand

Oölitic sand consists of loose, light-gray, windblown sand made up of small spherical particles of lime carbonate. It resembles fish eggs and is highly polished. Oölitic sand differs from other sand types in the fact that grains are chemical precipitates, growing in concentric layers around pre-existing nucleii. It occurs adjacent to the border of the Great Salt Lake and should not be considered a potential aggregate source.

Hcl

Clayey and/or limy hardpan

These soils occupy the extensive comparatively flat area between Salt Lake City and the Great Salt Lake. They are poorly drained, have a high ground-water level, and with minor exceptions contain excessive quantities of salts. Most of these soils show a well-developed zone of lime carbonate hardpan overlying lake-laid materials of dominantly fine texture (e.g. silts and/or clays). Areas overlain by these soils should be considered for borrow material only, and then, only when the salt content has been carefully considered.

Uc

Unclassified Soil

Two main areas not included in the soil survey made by the Department of Agriculture, due to obvious reasons, include the central portion of Salt Lake City and the huge Kennecott tailings pond north of Magna. However, the latter material can be considered a potential borrow source.

Erratum: The area labeled oölitic sand in the vicinity where the Jordan River crosses Highway 40 in western Salt Lake City should be labeled unclassified soil. (See north half of Potential Sources Map).

Qa

Alluvium

Sand, Silt, and Clay

Unconsolidated, fine-textured alluvial deposits occuring on gently sloping to nearly level surfaces in the floors of valley basins. Most of these surficial materials were deposited as sediments brought down by sheet wash from higher, older, alluviated area. These deposits should be considered a potential source of borrow material only.

Qaf

Alluvial fan deposits and colluivum

Gravel, Sand, Silt, and Clay

Unconsolidated material occuring in low, cone-shaped deposits at the mouths of canyons. These cones are steepest near the mouth of the canyon and slope gently outward with decreasing gradient. Coarser material fractions occur near the canyon mouth and finer fractions, deposited as "sheet wash'' and occasional "flash" run-off, occur toward the valley. Alluvial fan deposits, hence, are usually poorly sorted and much fine material must be wasted in order to make gravel. Most unused fans should be considered as potential borrow sources only unless conditions demand their use for gravel.

"Colluvium" is a general term applied to loose and incoherent deposits, usually at the foot of a slope or cliff, brought there chiefly by gravity. Talus, cliff debris, and material of avalanches are included in these deposits. Alluvium and angular fragments of local outcropping rock types make up colluvium. This, too, should be used only for borrow material.

Qgm **Qm**

Glaciated ground, undifferentiated moraines — Glacial till, chiefly Wisconsin

Gravel, Sand, Silt, and Clay

Glaciers occupied the heads of most of the larger canyons. The upper parts of Big Cottonwood Canyon at least, and all of Little Cottonwood Canyon were occupied by ice tongues. These glaciers modified the earlier stream valleys and deposited large masses of moraines and outwash. Three major stages of glaciation are discernible throughout the Central Wasatch Mountains. The most recent, the Wisconsin stage, is naturally more recognizable and has been separately designated in the map legend. Numerous lakes formed by glacial damming, and the plucking action of the ice, by which rock basins of considerable depth were created, are to be found at the heads of the larger canyons. Since the disappearance of the glaciers, erosion has been slight.

These deposits consist of bulky terminal and lateral moraines left at the mouths and along the margins of the major canyons. Material in these deposits consists of fresh to deeply-weathered blocks, boulders, and cobbles. Morainal deposits are often accompanied by deep valley trains and thick fan-like accumulations of outwash cobbles, gravel, sand, and silt. All these glacial materials comprise excellent potential gravel sources.

Tertiary rocks

TQa

Older alluvium

Gravel, Silt

These are the older alluvium covered surfaces which may be old pediment surfaces. Material in these deposits is unconsolidated and semi-consolidated and is quite calcareous on the surface. The age of these deposits is somewhat in doubt, but is believed to be Tertiary. The two main areas where older alluvium occurs are between Ledmans Wash and Harkers Canyon, three miles southwest of Bacchus; and along route 40 in Parleys Canyon, from Mountain Dell Reservoir to within one mile of the Summit County line. This material can be considered a good potential borrow source.

Th

Harkers fanglomerate

The Harkers fanglomerate makes up the major portion of the eastern foothills of the Oquirrh Mountains, and consists of a series of coalescing alluvial fans. It undoubtedly extends out into lower Jordan Valley under cover of subsequently deposited Lake Bonneville sediments. The fanglomerate, which is gray in color, is composed of angular to subrounded pieces of quartzite, sandstone, limestone, andesite, and latite, which range in size from silt particles to large boulders. Normally, the quartzite, sandstone, and limestone make up 80 to 85 percent of the unit. The fanglomerate is poorly consolidated by calcareous cement and forms an important potential aggregate source.

Tsl

Salt Lake Group

The Salt Lake group is composed of two units. The lower unit contains white marlstone, with some limestones, sandstones, clays, and rhyolitic tuffs, which are all fresh water lacustrine deposits. The upper unit consists mainly of poorly consolidated red to tan mudstones and siltstones, with several sandstones lenses. A basal conglomerate, primarily of igneous detritus, and some travertine deposits also occur. The Salt Lake group crops out on the western flank of the Salt Lake Salient, in several places in City Creek Canyon, in the Jordan Narrows, and in several small patches along the foothills of the West Traverse and Oquirrh Mountains. It is not considered to be an important materials source.

Tsa

South Mountain andesite flows

These rocks crop out in the Traverse Mountains in the extreme southern part of Salt Lake County. The largest occurence is near South Mountain. T rocks consist of flows, breccias, and water-laid tuffs. The dominant rock type is a gray to dark-gray, dense, and somewhat vesicular hornblende-hypersthene andesite. Hornblende and plagioclase phenocrysts are recognizabl in an aphanitic groundmass. Weathering produces various shades of purplish-gray, red, and red-brown. These rocks are not considered aggregate sources at present, but may gain in importance as road materials in the future.

Trc

Rose Canyon latite - andesite volcanics

These rocks are exposed in scattered patches along the foothills of the Oquirrh and West Traverse Mountains. The largest occurence is in the vicinity of Rose Canyon. The rocks are white to light-gray, and contain a considerable amount of hornblende and biotite. There are numerous altered feldspar phenocrysts in an aphanitic groundmass. These rocks are not considered aggregate sources at present, but may gain in importance as road materials in the future.

Tba

Butterfield andesite flows

These flows occur in scattered exposures in the eastern foothills of the Oquirrh Mountains between Bingham and Rose Canyons. The andesite is dark-gray on fresh surfaces and very dense. Weathered surfaces are light-gray, and resemble siltstone. It is composed of small crystallites of plagioclase in a fine groundmass. Some andesite porphyry flows also occur. These rocks are gray to dark-gray in color. Phenocrysts generally include andesine, augite, and magnetite. These rocks are not considered aggregate sources at present, but may gain in importance as road materials in the future.

Tk

Knight conglomerate

Large exposures of Knight conglomerate occur on the Salt Lake Salient and near Big Mountain in the extreme northeastern part of Salt Lake County. It consists of a series of reddish conglomerate, sandstone and shale. Conglomeritic fragments range in size from grit to large boulders, bound together by a calcareous cement. The predominant rock type of the conglomerat is a buff to pink quartzite. However, limestone, sandstone, and chert pebbles also occur. The Knight conglomerate is a good materials source, where it forms talus slopes and alluvial fans. It is a potential source of aggregate material.

Tv

Tertiary volcanics undifferentiated

These rocks occur in several exposures in City Creek Canyon. They consi of red to purple-weathering andesitic flows, breccias, and agglomerates. The rocks are quite porous and are not considered to be an important aggregate sou

Tp

Step Mountain and Shaggy Peak plugs

The Shaggy Peak plug occurs south of Dry Canyon in the southwestern portion of Salt Lake County. This rhyolite plug is approximately half a mile long and a third of a mile wide. The Shaggy Peak rhyolite has two chief varieties. One variety is light-gray with many quartz phenocrysts; the other is purplish-gray, and contains fewer quartz phenocrysts.

The Step Mountain plug or neck is exposed south of Rose Canyon, and is a beautiful example of a volcanic neck. The dominant rock is a light-gray, very coarsely porphyritic biotite-hornblende andesite. Both the Shaggy Peak and Step Mountain plugs are not considered to be potential aggregate sources.

Tqm

Bingham and Little Cottonwood stocks

The Bingham stock is a composite intrusive of granite, granite porphyry, and quartz monzonite, with associated dikes and sills. It is shattered, altered, and mineralized, and the site of the great Utah open-pit copper mine. The rock is light-to medium-gray in color, and is composed of quartz, feldspar, biotite, and hornblende. Phenocrysts of orthoclase are common.

The Little Cottonwood quartz monzonite stock constitutes the largest Tertiary igneous body in the Central Wasatch Mountains. It is exposed between Big Cottonwood Canyon and the Traverse Mountains in the southeastern portion of Salt Lake County. Though the texture is generally granitic, large orthoclase phenocrysts give the rock a porphyritic appearance. The rock is light-gray in color and is composed primarily of plagioclase, quartz, orthoclase, some biotite, and very little hornblende. It is a potential materials source.

Tgd

Alta stock

The Alta stock, a granodiorite with which the ore deposits of the Alta and Brighton mining areas are associated, occurs in the Brighton region and between Alta and Brighton. The rock consists essentially of plagioclase, quartz, orthoclase, biotite, and hornblende. It is pale-gray in color, and has a medium-grained granitic texture. The rock is very resistant to erosion, and forms a rugged group of peaks at the head of Big Cottonwood Creek. The Alta stock is in contact with, and has intruded to some extent the older Clayton Peak stock. It is a potential aggregate source.

Td

Clayton Peak stock

This intrusive body is a diorite, and occurs directly southeast of Brighton. This diorite is a dark-gray, rather fine-textured granular rock, which contains little quartz but enough orthoclase to almost be a monzonite. Its dark silicate minerals include biotite, hornblende, and augite. The principal area of the diorite is the one that includes Clayton Peak at the head of Big Cottonwood Creek. In the Brighton area the diorite is important as a materials source.

Cretaceous rocks

Kec

Echo Canyon - Wanship conglomerate

Exposures of this formation occur on the west and south side of the Salt Lake Salient and between Dry Creek and Parleys Canyons. It contains red, gray, and buff interbedded conglomerate with some sandstone, shale, and siltstone. The conglomerate is composed primarily of sandstone and quartzite pebbles, cobbles, and boulders, derived from the Frontier sandstone and Weber quartzite. Some material is derived from Carboniferous limestone. This formation is a potential materials source. Fresh outcrops, however, would require blasting before its use as an aggregate.

Kf

Frontier sandstone

This formation occurs between Emigration and Parleys Canyons. It is composed of yellowish-brown sandstone, interbedded with yellow or pale-red shale and some pebble and cobble conglomerate. The sandstone is massive, generally cross-bedded, but very friable. The Frontier sandstone cannot be considered a potential aggregate source.

Kk

Kelvin conglomerate

Although conglomerate forms its most prominent outcrops, the Kelvin also consists of reddish-brown to purple siltstone and some sandstone. The conglomerate contains well- rounded quartzite and chert pebbles and boulders. The Kelvin is exposed in Emigration Canyon and between Emigration and Parleys Canyons. It is a good potential source of aggregate material.

Jurassic rocks

Jm

Morrison formation

Small exposures of Morrison are found between Red Butte and Emigration Canyons and Emigration and Parleys Canyons. This formation contains a sequence of white to purple interbedded, friable sandstones and variegated silts. There are also several beds of white algal limestone. The Morrison is not considered to be a potential aggregate source.

Jp

Preuss formation

This formation crops out between Red Butte and Emigration Canyons, and between Emigration and Parleys Canyons. It is composed of pale-red shale and sandstone. It is not considered an important potential materials source.

Jtc

Twin Creek limestone

This formation occurs in massive exposures between Red Butte and Mill Creek Canyons. It consists of pale-gray limestone interbedded with greenish, limy shale. It is generally thin-bedded, and weathers to a gray-white color. The entire unit is soft, and forms low rounded slopes. The Twin Creek is quarried in Parleys Canyon for Portland Cement.

Jn

Nugget sandstone

The Nugget sandstone is usually reddish to salmon colored, medium-grained, well-cemented, and highly cross-bedded. It is a persistent ridge former wherever it is exposed. It crops out south of Red Butte Canyon, between Emigration and Parleys Canyons, between Parleys and Mill Creek Canyons, and in several isolated patches north of Big Cottonwood Canyon. In Parleys Canyon the Nugget has formed several alluvial fans, which have been used for aggregate material.

Triassic rocks

Trc

Chinle formation

This formation occurs south of Red Butte Canyon, between Emigration and Parleys Canyons, in Parleys Canyon, between Parleys and Mill Creek Canyons, and north of Big Cottonwood Canyon. It contains variegated reddish-brown siltstone, mudstone, soft shale, and some red to pale-gray limestone. It is not a potential materials source.

Trs

Shinarump formation

The Shinarump formation is a thin but very persistent formation. It is composed of a purplish, gritty quartzite, occasionally split by a parting of shale. Its grains, consisting mainly of quartz, are conspicuously large. The Shinarump crops out in Red Butte Canyon, between Emigration and Parleys Canyons, between Parleys and Mill Creek Canyons, and in several places north of Big Cottonwood Canyon. The best exposure of the Shinarump, however, is at the mouth of Parleys Canyon, where it is called Suicide Rock.

Tra

Ankareh shale

This formation contains red siltstone, shale, and soft sandstone, with some red to pale-gray limestone. It is exposed in Red Butte Canyon, between Emigration and Parleys Canyons, between Parleys and Mill Creek Canyons, and north of Big Cottonwood Canyon. The Ankareh is generally a slope former, and is not a potential aggregate source.

Trt

Thaynes formation

The Thaynes formation is exposed over large areas between Dry Creek and Red Butte Canyons, between Emigration and Parleys Canyons, between Parleys and Mill Creek Canyons, and north of Big Cottonwood Canyon. The Thaynes is usually divided into three members. A "lower lime" member shows brown to gray limestone alternating with thin beds of calcareous sandstone and shale. A "middle member" consists of red to green sandy shale and sandstone. An "upper lime" member contains buff to gray limestone and interbedded gray to brown sandstone and shale. The "lower lime" and "upper lime" members are cliff formers, and are potential materials sources.

Trw

Woodside shale

This formation is composed of dark-red sandy shales and silt stone, which locally have turned green due to secondary changes. It crops out in Dry Creek Canyon, near Mill Creek Canyon, and in several localities north of Big Cottonwood Canyon. The formation is usually a slope-former, and is not considered to be a good aggregate source.

Permian rocks

IPpc

Park City formation

This formation, named for the Park City mining district where it is exposed, occurs in Dry Creek and Mill Creek Canyons, and in several exposures north and northeast of Brighton. It consists of lower and upper members of gray cherty limestone and sandstone respectively, separated by a middle member of dark limy shale with thin beds of phosphate rock. It is a potential aggregate source.

Pennsylvanian rocks

Pw

Weber formation

This formation crops out north of Dry Creek, in Mill Creek Canyon, and in isolated patches northeast of the Brighton area. The Weber formation consists chiefly of pale gray or white and buff quartzite, interbedded with limy and dolomitic sandstone and a few thin layers of cherty limestone and dolomite. The Weber formation is very resistant and forms steep slopes with abundant talus, and therefore should be considered a potential materials source.

Pm

Morgan formation

This formation is exposed north of Dry Creek, in the northeastern part of Salt Lake County, along the south side of Mill Creek Canyon, and in several localities northeast of the Brighton area. The Morgan formation consists of pale-gray limestone with pink chert and minor amounts of greenish shale and quartzite. The Morgan should be considered as a potential source of aggregate material.

Tp

Step Mountain and Shaggy Peak plugs

The Shaggy Peak plug occurs south of Dry Canyon in the southwestern portion of Salt Lake County. This rhyolite plug is approximately half a mile long and a third of a mile wide. The Shaggy Peak rhyolite has two chief varieties. One variety is light-gray with many quartz phenocrysts; the other is purplish-gray, and contains fewer quartz phenocrysts.

The Step Mountain plug or neck is exposed south of Rose Canyon, and is a beautiful example of a volcanic neck. The dominant rock is a light-gray, very coarsely porphyritic biotite-hornblende andesite. Both the Shaggy Peak and Step Mountain plugs are not considered to be potential aggregate sources.

Tqm

Bingham and Little Cottonwood stocks

The Bingham stock is a composite intrusive of granite, granite porphyry, and quartz monzonite, with associated dikes and sills. It is shattered, altered, and mineralized, and the site of the great Utah open-pit copper mine. The rock is light-to medium-gray in color, and is composed of quartz, feldspar, biotite, and hornblende. Phenocrysts of orthoclase are common.

The Little Cottonwood quartz monzonite stock constitutes the largest Tertiary igneous body in the Central Wasatch Mountains. It is exposed between Big Cottonwood Canyon and the Traverse Mountains in the southeastern portion of Salt Lake County. Though the texture is generally granitic, large orthoclase phenocrysts give the rock a porphyritic appearance. The rock is light-gray in color and is composed primarily of plagioclase, quartz, orthoclase, some biotite, and very little hornblende. It is a potential materials source.

Tgd

Alta stock

The Alta stock, a granodiorite with which the ore deposits of the Alta and Brighton mining areas are associated, occurs in the Brighton region and between Alta and Brighton. The rock consists essentially of plagioclase, quartz, orthoclase, biotite, and hornblende. It is pale-gray in color, and has a medium-grained granitic texture. The rock is very resistant to erosion, and forms a rugged group of peaks at the head of Big Cottonwood Creek. The Alta stock is in contact with, and has intruded to some extent the older Clayton Peak stock. It is a potential aggregate source.

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Clayton Peak stock

This intrusive body is a diorite, and occurs directly southeast of Brighton. This diorite is a dark-gray, rather fine-textured granular rock, which contains little quartz but enough orthoclase to almost be a monzonite. Its dark silicate minerals include biotite, hornblende, and augite. The principal area of the diorite is the one that includes Clayton Peak at the head of Big Cottonwood Creek. In the Brighton area the diorite is important as a materials source.

Cretaceous rocks

Kec

Echo Canyon - Wanship conglomerate

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Kf

Frontier sandstone

This formation occurs between Emigration and Parleys Canyons. It is composed of yellowish-brown sandstone, interbedded with yellow or pale-red shale and some pebble and cobble conglomerate. The sandstone is massive, generally cross-bedded, but very friable. The Frontier sandstone cannot be considered a potential aggregate source.

Kk

Kelvin conglomerate

Although conglomerate forms its most prominent outcrops, the Kelvin also consists of reddish-brown to purple siltstone and some sandstone. The conglomerate contains well- rounded quartzite and chert pebbles and boulders. The Kelvin is exposed in Emigration Canyon and between Emigration and Parleys Canyons. It is a good potential source of aggregate material.

Jurassic rocks

Jm

Morrison formation

Small exposures of Morrison are found between Red Butte and Emigration Canyons and Emigration and Parleys Canyons. This formation contains a sequence of white to purple interbedded, friable sandstones and variegated silts. There are also several beds of white algal limestone. The Morrison is not considered to be a potential aggregate source.

Jp

Preuss formation

This formation crops out between Red Butte and Emigration Canyons, and between Emigration and Parleys Canyons. It is composed of pale-red shale and sandstone. It is not considered an important potential materials source.

Jtc

Twin Creek limestone

This formation occurs in massive exposures between Red Butte and Mill Creek Canyons. It consists of pale-gray limestone interbedded with greenish, limy shale. It is generally thin-bedded, and weathers to a gray-white color. The entire unit is soft, and forms low rounded slopes. The Twin Creek is quarried in Parleys Canyon for Portland Cement.

Jn

Nugget sandstone

The Nugget sandstone is usually reddish to salmon colored, medium-grained, well-cemented, and highly cross-bedded. It is a persistent ridge former wherever it is exposed. It crops out south of Red Butte Canyon, between Emigration and Parleys Canyons, between Parleys and Mill Creek Canyons, and in several isolated patches north of Big Cottonwood Canyon. In Parleys Canyon the Nugget has formed several alluvial fans, which have been used for aggregate material.

Triassic rocks

Trc

Chinle formation

This formation occurs south of Red Butte Canyon, between Emigration and Parleys Canyons, in Parleys Canyon, between Parleys and Mill Creek Canyons, and north of Big Cottonwood Canyon. It contains variegated reddish-brown siltstone, mudstone, soft shale, and some red to pale-gray limestone. It is not a potential materials source.

Trs

Shinarump formation

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Tra

Ankareh shale

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Trt

Thaynes formation

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Trw

Woodside shale

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Permian rocks

IPpc

Park City formation

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Pennsylvanian rocks

Pw

Weber formation

This formation crops out north of Dry Creek, in Mill Creek Canyon, and in isolated patches northeast of the Brighton area. The Weber formation consists chiefly of pale gray or white and buff quartzite, interbedded with limy and dolomitic sandstone and a few thin layers of cherty limestone and dolomite. The Weber formation is very resistant and forms steep slopes with abundant talus, and therefore should be considered a potential materials source.

Pm

Morgan formation

This formation is exposed north of Dry Creek, in the northeastern part of Salt Lake County, along the south side of Mill Creek Canyon, and in several localities northeast of the Brighton area. The Morgan formation consists of pale-gray limestone with pink chert and minor amounts of greenish shale and quartzite. The Morgan should be considered as a potential source of aggregate material.

UTAH STATE DEPARTMENT OF HIGHWAYS

DISTRICT 2 MATERIALS SECTION

ROY D. TEA, DISTRICT MATERIALS ENGINEER, D. M. LEFEVRE, ASST. DIST. MATL'S ENGR.

MAP COMPILED BY A. G. SIDLER, GEOLOGIST

GENERAL GEOLOGY FROM 1960 GEOLOGIC MAP OF SALT LAKE COUNTY AND 1963 GEOLOGIC MAP OF N.W. UTAH

PIT MAPPING BY H. A. A. VLAM and A. G. SIDLER

SOIL TYPES FROM U. S. DEPT. OF AGRICULTURE SOIL MAP

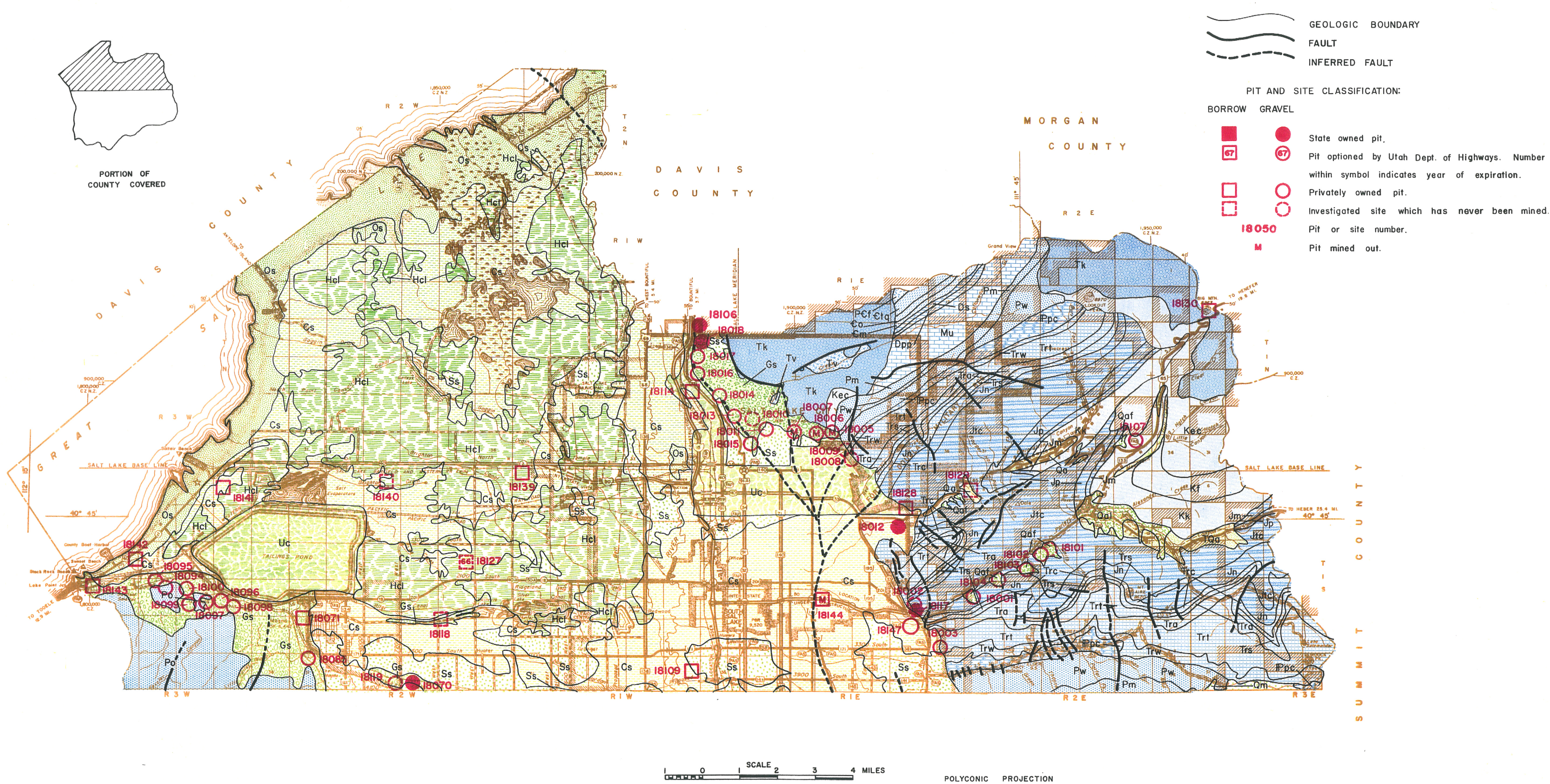
MAP DRAWN BY M. J. BULLETT, ASSISTED BY N. K. BOHIDAR and A. G. SIDLER

SAND AND GRAVEL MAPPING BY HEBER A. A. VLAM, GEOLOGIST

1964
PIT LOCATIONS AND POTENTIAL SOURCES MAP

SHOWING GRAVEL AND BORROW PITS AND THE RELATIONSHIP OF KNOWN MATERIALS SITES TO POTENTIAL SITES

SALT LAKE COUNTY, UTAH



LIMIT OF EXTENT OF DEPOSITS FORMED DURING DIFFERENT LEVELS OF LAKE BONNEVILLE

LEGEND

QUATERNARY DEPOSITS

– H.A.A. VLAM , 1963

Qfd	POST LAKE BONNEVILLE FLOODPLAIN AND DELTA DEPOSITS

LAKE BONNEVILLE SHORE FACIES OF SAND AND GRAVEL ; OFF-SHORE SILTS

Qpp	POST-PROVO
Qp	PROVO
Qap	ALPINE


LIMIT OF EXTENT OF MAJOR DEPOSITS OF SAND AND GRAVEL FROM LAKE BONNEVILLE
- H.A.A. VLAM, 1963


LIMIT OF EXTENT OF MAJOR DEPOSITS
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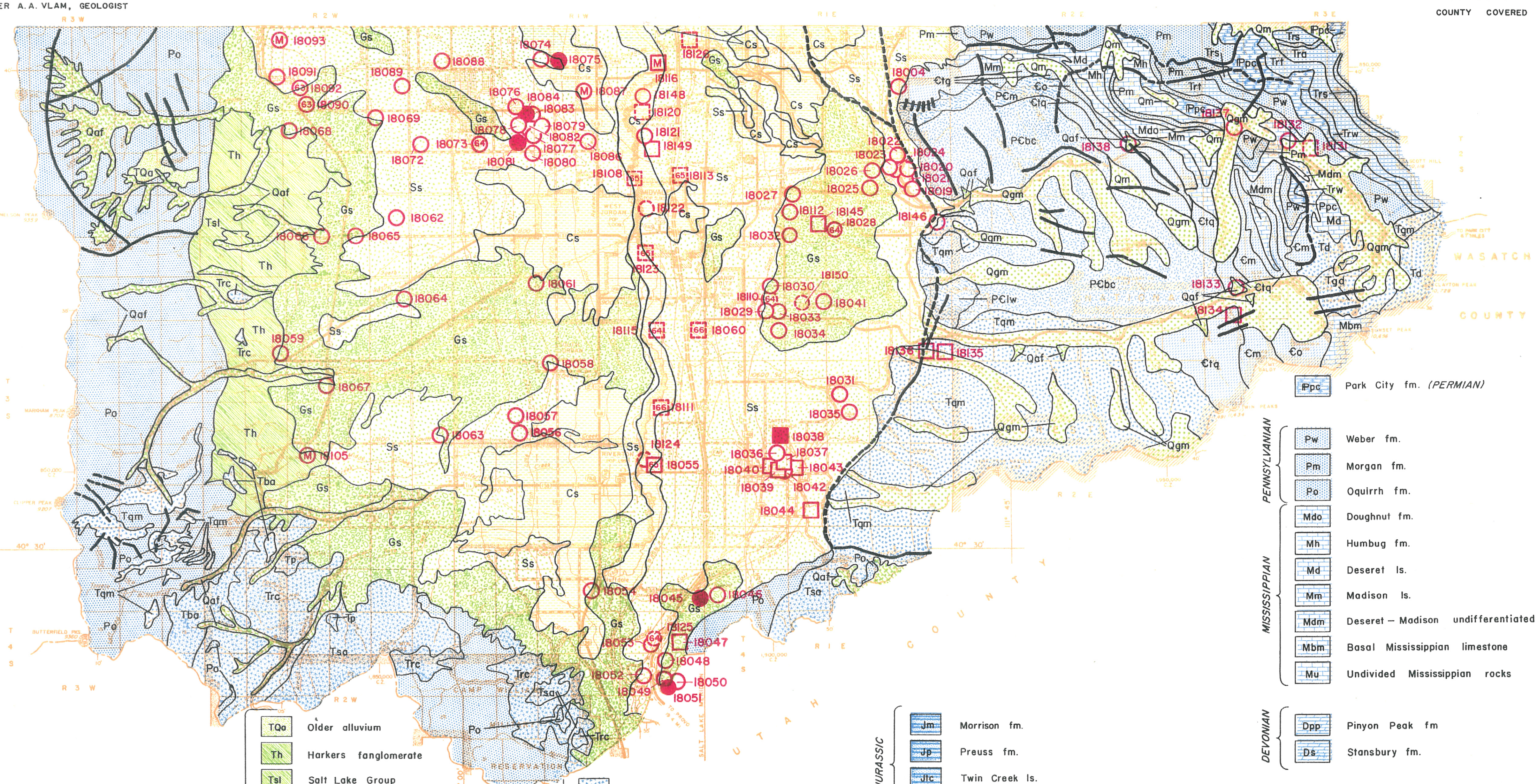
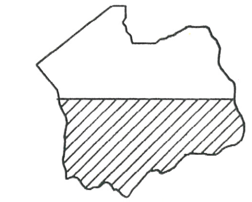


PORTION OF COUNTY COVERED



QUATERNARY

- Gs Gravely soil
- Cs Clayey soil
- Ss Sandy soil
- Os Oölitic sand
- Hcl Clayey and/or limy hardpan
- Uc Unclassified soil
- Qa Alluvium
- Qaf Alluvial fan deposits and colluvium
- Qgm Glaciated ground, undifferentiated moraines
- Qm Glacial till, chiefly Wisconsin

TERTIARY

- TQa Older alluvium
- Th Harkers fanglomerate
- Tsl Salt Lake Group
- Tsa South Mountain andesite flows
- Trc Rose Canyon latite – andesite volcanics
- Tba Butterfield andesite flows
- Tk Knight conglomerate
- Tv Tertiary volcanics – undifferentiated
- Tp Step Mountain – Shaggy Peak plugs
- Tqm Bingham and Little Cottonwood stocks (quartz monzonite)
- Tgd Alta stock, granodiorite
- Td Clayton Peak stock, diorite

CRETACEOUS

- Kec Echo Canyon – Wanship cg.
- Kf Frontier ss.
- Kk Kelvin cg.

JURASSIC

- Jm Morrison fm.
- Jp Preuss fm.
- Jtc Twin Creek ls.
- Jn Nugget ss.

TRIASSIC

- Trc Chinle fm.
- Trs Shinarump fm.
- Tra Ankareh sh.
- Trt Thaynes fm.
- Trw Woodside sh.

- Ppc Park City fm. (PERMIAN)

PENNSYLVANIAN

- Pw Weber fm.
- Pm Morgan fm.
- Po Oquirrh fm.

MISSISSIPPIAN

- Mdo Doughnut fm.
- Mh Humbug fm.
- Md Deseret ls.
- Mm Madison ls.
- Mdm Deseret – Madison undifferentiated
- Mbm Basal Mississippian limestone
- Mu Undivided Mississippian rocks

DEVONIAN

- Dpp Pinyon Peak fm
- Ds Stansbury fm.

CAMBRIAN

- €m Maxfield ls.
- €o Ophir sh.
- €tq Tintic quartzite

PRECAMBRIAN

- P€m Mutual fm.
- P€bc Big Cottonwood complex
- P€lw Little Willow series
- P€f Farmington complex

SCALE 1 0 1 2 3 4 MILES